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1933 — Development of process and equipment for Hi-Btu Oil Gas with solid fuel heating. Contributed by members of the gas industry including W. E. Steinwedell of Gasmaco.

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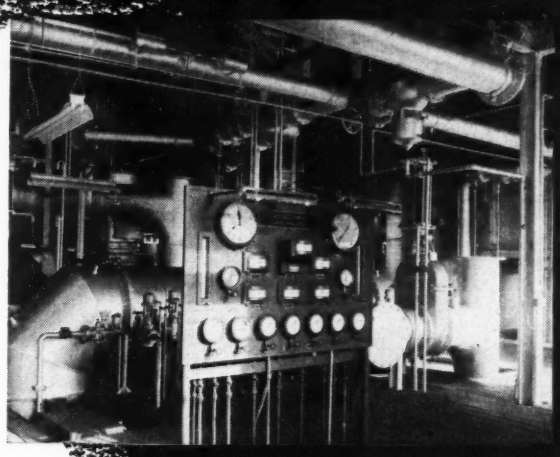
1947 — Four Shell Regenerative Oil Gas Apparatus for heavy oils. (Hall A.G.A. Process).

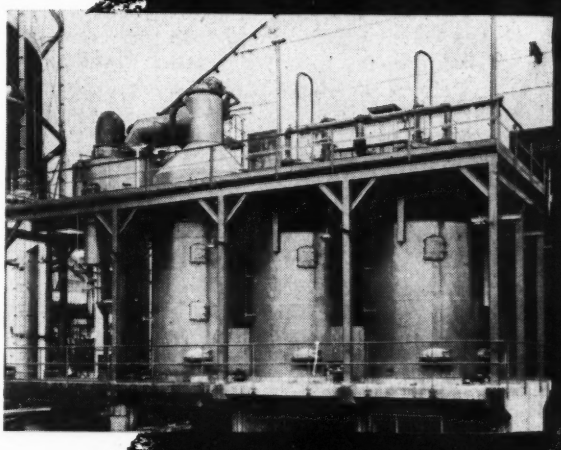
1948 — Two Shell Regenerative Oil Gas Set. The Inverted "U".

1949 — Back Blast modification of existing sets to accommodate heavy high carbon oils and improve efficiency.

1950 — Low cost conversion methods, adapting water gas plants to natural gas substitutes.

1951 — Development of new and improved auxiliary equipment for Tar Handling, Gas Washing, Oil Scrubbing, Light Oil Recovery and other problems peculiar to Hi-Btu Oil Gas.





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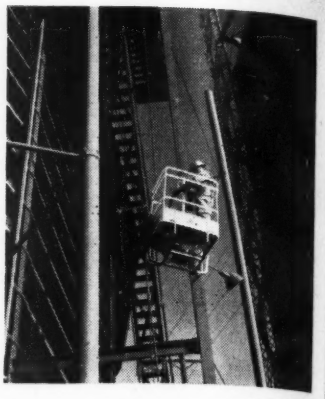

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These maneuverable cages have taken the place of the bos'n chair at SoCal. (See story on page 38).

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Thermally Thinking

SPOT NEWS AND COMMENT ON GAS INDUSTRY AFFAIRS

Highlighting the News

Gas replacing coal

The obvious fact that gas and oil are replacing coal as a national fuel is further substantiated in a Bureau of Mines comparative fuels survey, which shows that coal supplied but 43% of the nation's heat in 1951 as against 80% in 1935, while the petroleum products' share during the period rose from 19% to almost 54%.

Canada, New England cases consolidated

Hearings now in progress on the New England gas supply embroilment have been further cluttered by FPC's decision to consolidate with them the application of Tennessee Gas to export gas to Canada through Niagara Gas Transmission Ltd. Included as part of this latter docket is TGT's appeal to boost deliveries to Northeastern, one of the principals in the fight for the New England market. (For news of other developments in the case, see Pipeline News section.)

PAD kills Order No. 2

PAD killed its Order No. 2 effective March 1, but in doing so warned that local controls will still be needed in some critical areas. It is doubtful that many state bodies will immediately lift their own bans.

Three new states may join IOCC

Interstate Oil Compact Commission will have three new member states if bills introduced in Wyoming, North Dakota, and Nebraska to affiliate with the compact are successful.

Excess profits tax

If the excess profits tax is killed, utilities may actually suffer. A new corporation rate increase, which is reportedly planned by administration experts as a means of offsetting the $2.5 billion loss when EPT expires, might not give utilities the special treatment enjoyed under the existing setup.

A free market

The Controlled Materials Plan will go out the window in the third quarter. GAMA says this will mean an "open-ended" CMP immediately to permit manufacturers sufficient lead time to place orders with mills. By July, gas equipment and appliance manufacturers will be in a free market.

Depletion allowance appears safe

The 27½% depletion allowance for producers appears safe, insofar as this Congress is concerned. Proponents of the Truman scheme to "plug the tax loophole" probably won't even introduce it this session.

Navy sure to lose tidelands

The Navy isn't at all optimistic over chances of keeping the tidelands reserves, which ex-President Truman gave it just before leaving office. The department is so certain that it will have to give them back that it hasn't even set its lawyers to work on ways to implement control of the lands.

Residential construction up

Good news in the gas market is the F. W. Dodge report that residential construction contracts in the 37 states east of the Rockies totaled $460 million in January, up 5% from December and 36% from January 1952.

An Eye on the Capital

New gas legislation

New legislation affecting the natural gas industry is being introduced rather fast in the Congress, while the House Committee on Interstate and Foreign Commerce is getting ready to hold extended hearings on legislation that already has been introduced.

Sen. Everett Dirksen (R.-Ill.) has introduced S. 525 to amend Section 7 (h) of the Natural Gas Act. This section allows certificate holders to acquire pipeline rights-of-way by eminent domain proceedings in the district court, providing the practice or procedure used conforms to that of the state in which the property is located.

The amendment would broaden the language of the section to include land "for the [underground] storage of gas" as well as for location of compressor stations. It will be recalled that Natural Gas Storage Co. of Illinois has been seeking such new authorization from the Illinois state government.

Rep. John E. Lyle Jr. (D.-Texas) has introduced H. R. 2120 to relieve independent producers-gatherers of natural gas from FPC jurisdiction. This bill is very similar to the Kerr bill, which passed both the Senate and the House of Representatives three years ago and was vetoed by President Harry S. Truman. Its purpose is said to be to act as a backstop just in case the federal courts should reverse the FPC decision in the Phillips Petroleum Co. case.

Rep. Frank Bow (R.-O.), author of the famous "Bow Amendment" to the Defense Production Act, which put the screws on Petroleum Administration for Defense a year ago, has introduced H. R. 2679, to amend the Natural Gas

Thermally Thinking

Act to relieve strictly intrastate, or metropolitan area, gas operations from FPC jurisdiction. This bill is virtually the same as the bill introduced during the past four years by Sen. John Bricker (R.-O.). It has the endorsement of the National Assn. of Railroad and Utilities Commissioners. Its purpose is to relieve difficulties resulting from the U. S. Supreme Court's famous "East Ohio Gas decision."

Rep. Charles W. Wolverton (R.-N. J.), who is not ailing physically as was the former Democratic chairman of the House Interstate Committee, has moved with dispatch to have the various regulatory commissions, including FPC, testify on legislative proposals for modification of regulatory commission functions and amendments to their basic acts. Rep. John W. Heselton (R.-Mass.) and Rep. Bow also have testified on various changes they think should be made. John W. Randolph, executive Washington secretary of the National Assn. of Railroad and Utilities Commissioners, is likely to testify in favor of the legislation to amend the Natural Gas Act to keep FPC out of purely intrastate gas company operations.

It seems evident, now that the reorganization of Congress is out of the way, that the House Interstate Committee will report out a number of bills that have been logjammed there for some years. Whether the same thing will happen in the Senate, where Sen. Charles W. Tobey (R.-N. H.), a "liberal" Republican, is chairman, remains to be seen.

What is going to happen to Petroleum Administration for Defense, including its restrictions on space-heating customers, its priorities and allocations on pipe, and a thousand-and-one other powers, had not been decided when this column left Washington, but it seemed to be a good guess that PAD would soon be as dead as the proverbial dodo.

An official, questioned about what might come, said candidly: "Rumors are a dime a dozen over here. I can truthfully say for the first time in my life that any reporter in town has as good an idea about what is going to happen tomorrow as I have—and some of them no doubt know a lot more."

It seemed pretty apparent, however, that PAD would be out of business by June 30—the question is, how much sooner. Already it has begun trimming off some activities. PAD Order No. 2, the space-heating limitation directive, was rescinded effective March 1. "Our surveys show that the purpose of the order—to make sure that no defense plants would be deprived of essential fuel through any shortage of gas—has now been fulfilled," said Deputy Petroleum Administrator J. Ed Warren in announcing the move.

The Natural Gas Production and Processing and Distribution and Marketing Divisions were liquidated Feb. 28, with their functions being transferred to the Refining Division and Supply and Transportation Divisions, respectively.

FPC and introduction of evidence

The intriguing question of whether or not the commissioners who are more-or-less temporarily on the FPC have the right to control the introduction of evidence before trial examiners who are hearing the initial stages of cases later to come before the FPC has brought about a sharp clash between FPC counsel and Trial Examiner Emory J. Woodall at a recent hearing here.

In a case involving gas transmission to Missouri, Illinois, Indiana, Michigan, and Ohio, Mr. Woodall declared his refusal to be bound by past decisions of the commission when he allowed counsel for the Panhandle Eastern Pipeline Co. to admit testimony based on the prevailing field prices of gas. Also involved in the controversy is the question of whether or not FPC will recognize the validity of the conservation laws of Kansas and Oklahoma, which do allow the prevailing field prices for natural gas.

When his objection was overruled by the Trial Examiner, FPC Counsel Robert Russell moved to appeal the decision to the commissioners.

Mr. Woodall takes the position that under the Administrative Procedure Act, trial examiners are free to determine the propriety and admissibility of evidence even though it be of a nature that the FPC staff insists the commission has excluded in previous cases. He pointed out that his position is the same as that of a circuit court judge and that unless he acts to admit evidence he thinks is germane, he is doing both himself and the FPC a disservice. He pointed out that FPC itself is not a law-making body, but merely attempts to interpret laws passed by Congress.

A contention in the case revolves around the age-old original cost theory of rate regulation, which has forced "natural gas companies" to "spin off" reserves to newly formed companies because of the risk involved and the low rate of return. Panhandle's testimony purported to show how this practice has increased.

The scuttle-butt around FPC has it that no one should be surprised if Mexican gas *is* allowed to be imported into the U. S.—for use by chemical plants along the American side of the border—sometime during this year. The FPC turned down flatly one company's plans to import Mexican gas several months ago, but the rumor now is that another company has a better plan and has the inside track with the Mexicans for firm commitments on sale of the gas. Just how authentic these rumors are will be known in a few weeks, or months.

Union Electric takes rate survey

When Union Electric Co. of Missouri, St. Louis, was forced to seek its first electric rate increase in 34 years recently, the customer business department directed its survey group (described in January *GAS*, pp. 47-50) to find out how customers reacted to the announcement. Interviews were conducted in a routine manner, with no reference being made to the proposal. Some results:

Of 495 interviewed, 111 or 22.4% mentioned the rate increase.

Fifty-nine customers (11.9%) were favorable; 32 (6.9%) were unfavor-

(Continued on page 62)

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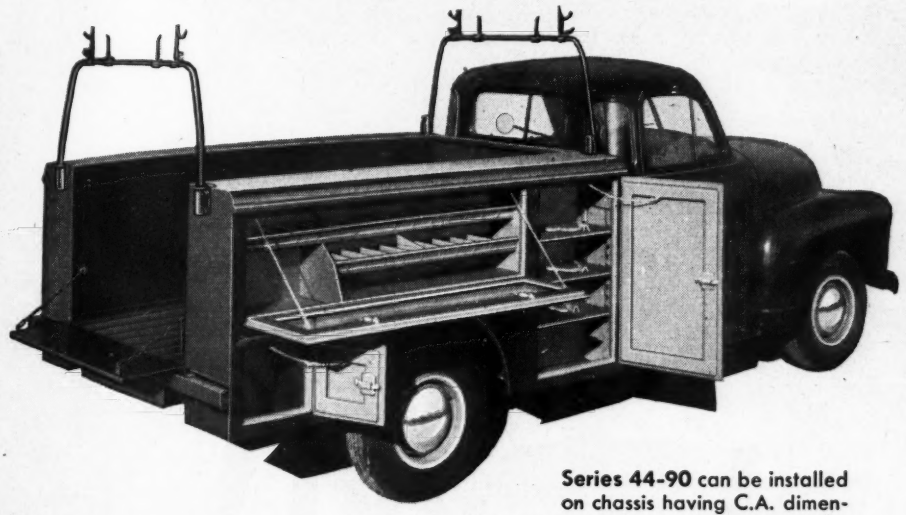

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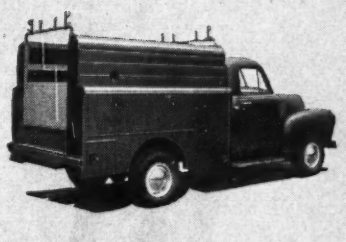
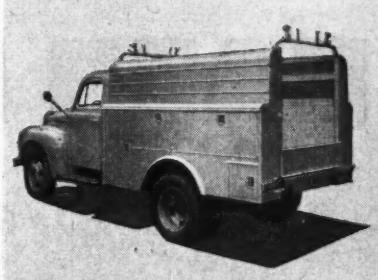


Series 44-L-90 for chassis having approximately 48″ C.A. dimension.



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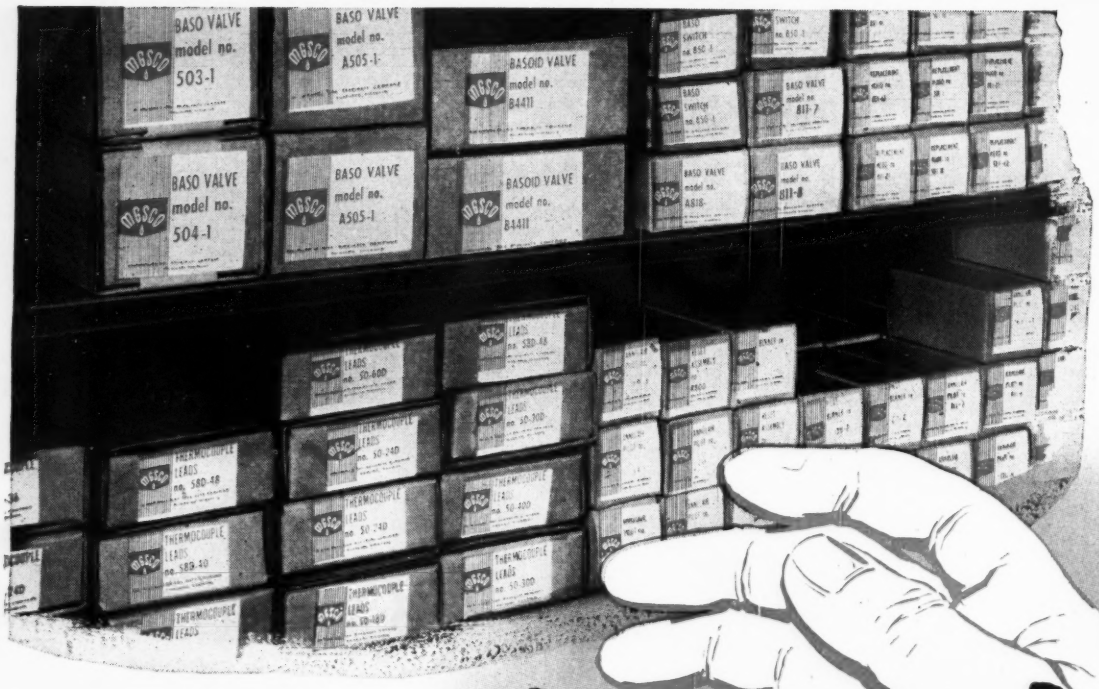
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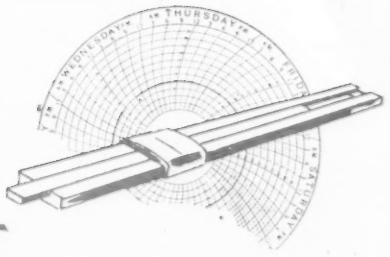

• By GUY CORFIELD

Soil corrosion of galvanized and alloy steel

Two interesting studies on the above subject have just been released by the National Bureau of Standards, the result of the Bureau's long term field burial tests of various coated and alloyed metals commonly used in underground structures. These studies are "Corrosion of Galvanized Steel in Soils" and "Corrosion of Low-Alloy Irons and Steels in Soils," both by I. A. Denison and M. Romanoff and both appearing in the November 1952 issue of the *Journal of Research* of the National Bureau of Standards. They can be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at a cost of 10 cents each.

Regarding the value of galvanizing to protect underground steel, it has been the opinion of many corrosion engineers that the effectiveness of a normally applied hot dip zinc coating is not sufficient to place dependence on it alone nor, in general, to justify its cost. It appears, however, from this NBS study that this opinion may not be sound under all conditions, and at least the subject should be carefully re-examined.

The initial burial tests, involving zinc coatings of varying thicknesses buried at 47 locations in 1924, indicated that a nominal thickness equivalent to 3 oz per sq ft provided significant protection in some cases. In 1937, therefore, additional specimens of galvanized steel and of zinc and uncoated steel were buried in 15 new sites selected to represent typical soil types with respect to salt content, acidity, drainage, etc. These specimens were removed periodically over a 13-year span and the data carefully analyzed with very interesting results. In approximately one-half of the soils, four of which were alkaline and highly corrosive to bare steel, the zinc coating remained virtually intact and provided complete protection to the steel under it; and in five of the soils the zinc practically disappeared, which, in two cases (organic soils), permitted the steel to corrode as rapidly as the corresponding bare specimens, but in the other cases retarded the steel deterioration. It is considered possible that in the cases where protection continued even after the zinc had apparently disappeared, it was due to the formation of a silicious film or coating deposited by the earlier cathodic protective action of the zinc.

The effect of zinc coating thickness was also analyzed, and it appeared that the protective value of a given thickness depends on the type of soil. The study indicated that the minimum weight of zinc to give protection for a minimum of 10 years was 2 oz per sq ft in inorganic oxidizing (aerated) soils, 3 oz in inorganic or organic highly reducing soils. It might be noted that a hot dip coating may not be practical for a zinc thickness much above the equivalent of 3 oz per sq ft, but any thickness can be obtained by a flame spray or "metallizing" process.

It therefore appears that the engineer concerned with soil corrosion problems would be well advised to review this study carefully and then examine the types of soil with which he is confronted to see if galvanizing may have a place in the protection program. It should be remembered that a zinc coating is essentially a galvanic protective means and may therefore be balanced against the use of zinc or magnesium galvanic anodes; and that from a practical standpoint, when installing galvanized piping systems or fittings, wrench marks and other severe abrasions of the zinc film should be avoided. Welding will introduce the need for a patch coating where the zinc has been burned off the steel.

The second study, on low-alloy steels, seems to confirm another general opinion of corrosion engineers, that low percentages of copper, nickel, chromium, etc., do not produce economical and dependable, and in some cases even definitely observable improvement in resistance of steel to underground corrosion. In this study 10 varieties of iron and steel were buried for periods up to 13 years in 14 different soils, and then examined for weight loss and depth of pitting. Alloying elements, in percent, ranged from .03 to .08 carbon, .003 to .84 silicon, .01 to .49 manganese, .02 to 5.76 chromium, .07 to 1.96 nickel, .004 to 1.01 copper, .07 to .57 molybdenum, .005 to .032 sulfur and .007 to .124 phosphorous.

As would be expected the type of soil was found to be important, depending on whether it enabled the corrosion products to form a protective film, or allowed them to diffuse or migrate away. Quoting from the summary: "The general effect of the alloying elements was to reduce the initial rate of corrosion of the alloys as measured by weight loss but to increase the initial rate of pitting. Except in very poorly aerated soils, the rate of pitting of the alloy steels diminished more rapidly with time than the rate of pitting of plain steel, with the result that the maximum depth of pits after the maximum period of exposure was less on the alloy steels than on the plain steels. Chromium was observed to have the most pronounced effect on weight loss, but for maximum reduction in pitting, molybdenum was also necessary."

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GAS exclusive

Should shut-off valves be put ahead of safety relief devices?

By K. R. D. WOLFE • Fisher Governor Co., Marshalltown, Iowa

SAFETY relief devices of all types in gas distribution systems are now receiving the concentrated attention of distribution engineers and public utility gas companies. Considerable work is being done in planning and installation of such devices, particularly on low pressure gas distribution systems to protect them from over-pressure in case of regulator failures.

One of the questions being widely discussed, and for which there seems to be no definite answer, is the question of whether shut-off valves should be installed ahead of safety relief devices on gas distribution systems.

The purpose of this article is to review various American standard codes bearing upon this subject, most of which specifically prohibit the use of shut-off valves ahead of safety relief devices.

Most of these safety codes bearing directly upon the gas distribution industry are comparatively new and nearly all of them referred to in this connection simply specify that safety relief devices shall be used, and no further reference is made as to the details of their installation.

It is my belief that as these codes become older and the writers of them develop more years of experience, more details will be included to make the codes more restrictive and, no doubt, they will ultimately approach many of the old codes where similar safety devices are used and where these more restrictive conditions are now included.

From the code for pressure piping, ASA B31.1-1952, Section 2, Gas and Air Piping, Paragraph 209 entitled "Pressure Reducing and Relief Devices" reads as follows:

(a) Each piping system within the scope of this section supplied through one or more pressure reducing devices, the maximum inlet pressure to which is above the maximum allowable working pressure of the piping system, shall include one or more pressure relief or safety devices. Proper protection shall be provided to prevent possible injury or damage caused by discharge of gases from such devices.

(b) Combined discharge capacity of the pressure relief or safety devices and their location shall be such that the maximum allowable working pressure of the piping system shall not be exceeded by more than 10% when the pressure relief or safety devices are blowing. The relief or safety valve should be located adjoining, or as close as possible to the reducing valve.

While this code does not specifically prohibit the use of a shut-off valve ahead of the safety device, it could be inferred that that was what was meant by the sentence, "The relief or safety valve should be located adjoining, or as close as possible to the reducing valve."

> An ASA committee is currently at work revising the ASA code for pressure piping (see *GAS*, January) but to date no official decision has been made on this question.

Other codes bearing on this subject are of interest too. For instance, Pamphlet 58 as published by the National Board of Fire Underwriters in the August 1952 issue under the heading "Standards for Storage and Handling of Liquefied Petroleum Gases," sub-heading "Basic Rules," Paragraph B.9., Safety Devices, sub-paragraph F reads as follows:

No shut-off valves shall be installed between the safety relief valves and the container, except that a shut-off valve may be used where the arrangement of this valve is such as always to afford full required capacity flow through the relief valve.

The above exception is made to cover such cases as a 3-way valve installed under two safety relief valves, each of which has the required rate of discharge and is so installed as to allow either of the safety valves to be closed off, but does not allow for both safety valves to be closed off at the same time. Another exception to this may be where two separate relief valves are installed with the individual shut-off valves. In this case the two shut-off valve stems shall be mechanically interconnected in a manner that will allow full required flow of one of the relief valves at all times.

Another code that has bearing on the same subject and is similar to the one quoted above is that from the API-ASME code on unfired pressure vessels for the petroleum liquids and gases, dated 1938. This, of course, is sponsored by the American Petroleum Institute and the American Society of Mechanical Engineers. On page 73, paragraph W-602 entitled "Stop Valves Between Pressure Relief Devices and Vessel" reads:

(a) A vessel in which pressures can be generated because of service conditions shall have no stop valve between the vessel and its pressure relieving device, except for inspection and repair purposes as permitted in paragraph C, and except in cases where multiple pressure relieving devices are provided and the stop valves are so constructed that they cannot be operated so as to reduce the pressure relieving capacity below that required.

(c) A vessel normally in operation for indefinite periods at temperatures below 200° F may have a stop valve between it and its pressure relieving device for use in inspection and repair, in which case the stop valve shall be locked or sealed open and shall not be closed except by an authorized person who shall replace the safety device and again lock or seal the stop valve in the open position before leaving the location.

The above code is the only one that seems to provide a means for installing a single shut-off valve ahead of a single relief valve when operated under certain limited conditions.

Other codes bearing upon this subject are as follows:

The ASME code, power boilers, dated 1940 published by the American Society of Mechanical Engineers on page 110, paragraph P-278 quoted in part is as follows:

> No valve of any description shall be placed between the required safety valves or valves and the boiler, nor on the discharge pipe between the safety valve and the atmosphere. When a discharge pipe is used, the cross-sectional area shall be not less than the full area of the valve outlet or of the total of the area of the valve outlet's discharging thereinto and shall be as short and straight as possible and so arranged as to avoid undue stresses on the valve or valves.

The Marine Engineering Regulations and material specifications issued by the United States Coast Guard, Issue CG-115 dated April 1948, under the main heading of "Unfired Pressure Vessels" page F-143, Section 54.01-30, relief valves, Sub-Paragraph D says:

> All relief valves for use on unfired pressure vessels or on piping systems where approved safety valves are not required shall, in general, comply with the requirements for safety valve construction in Part 52 of this sub-chapter, and shall be designed to suitably meet the protection and service requirements for which they are intended, except that the relief valves are not required to have huddling chambers for services other than steam. Cast iron may be employed in the construction of relief valves for pressures not exceeding 125 lbs/sq in. and temperatures not exceeding 450° F.

Part 52 referred to above is as follows, sub-paragraph C:

> No valve shall be placed between the required safety valves and the boiler or unfired steam generator nor in the escape pipe between the safety valve and the atmosphere.

There is still one other code bearing on this subject that should be considered and I quote as follows: ASME suggested rules, care of power boilers, 1949. This is taken from page 51 under paragraph C315 entitled "Intercommunicating Valves Between Systems of Differential Pressures." Part of the paragraph is quoted as follows:

> Where a reducing valve is used, a hand valve shall also be installed. A steam gauge shall be installed at a convenient point for the guidance of persons who are operating the hand valve in lieu of the reducing valve. Where safety valves are applied to a header, they shall be applied directly to the header without any intervening stop valves or fittings.

In view of the above codes, I take no sides in the discussion as to whether or not a shut-off valve should be installed ahead of the safety device but I do believe that ultimately certain codes pertaining to the gas industry will specify such limitations.

Gas protects crops from frost damage

THE eight states that stretch across the southern border of the United States, from Atlantic to Pacific, depend for much of their income on farm produce grown during their normally warm winters, while the rest of the nation is shivering. But an occasional winter storm, howling down from the north, overnight can destroy vegetable crops nurtured all season or fruit groves pampered for years.

Consider, as an example, irrigated Hidalgo county on the Rio Grande. Hidalgo is Texas' leading county in value of crops and in quantity of citrus. Its temperature average for January is a mild 60°. But such an average includes brief cold snaps that can freeze out years of work and investment. An exceptional cold spell in the winter of 1950-51 wiped out seven million citrus trees (worth $160 million to $250 million) and almost all vegetable crops in Hidalgo and two adjacent counties.

The desolation that followed that winter's freeze gave an idea to Leonard A. Salmon, a construction foreman of Hidalgo county who knew little about farming except that frigid weather was bad for it. Mr. Salmon devised an outdoor heating device, which he called the Whirling Flame.

The Whirling Flame consists of two arms, 46 ft across, atop a sturdy 10-ft-high pipe. At the end of each arm are three jets burning natural gas fed by underground pipes. The jets cause the arms on which they are mounted to rotate slowly. Each Whirling Flame casts a benign warmth over an acre and a half.

Mr. Salmon installed nine Whirling Flames experimentally last winter on 12 acres of cucumbers and squash half a mile from the Rio Grande. Winter's first frost—only 30°—killed most of the squash in Hildalgo county. But the acres shielded by gas jets remained comfortably safe with temperatures of 40 to 90°. An acre of squash may be worth $500 to $1000 to the grower in the winter, when prices soar in northern markets. Thus one saved crop may pay for installation of an artificial warmer, provided there is a supply of natural gas at hand.

L. M. Salmon lights one unit of his Whirling Flame invention for protecting crops from frost damage. Each unit burns 10 Mcf of gas per hour, roughly 50 cents worth of fuel, but it has saved this field of squash and cucumbers three times.

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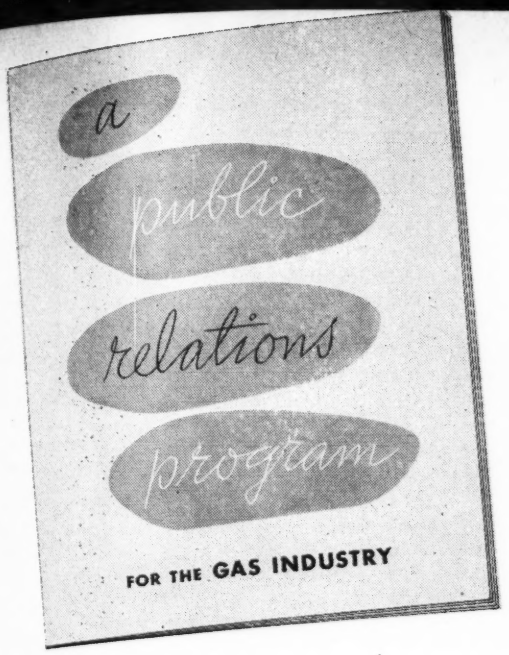


GAS staff report

AGA seeks approval of public relations program

IN the hands of several hundred gas company executives last month rested the decision as to whether the industry, as a unit, will seek to attract the respect and affection from the public that it deserves. If a sufficient number pledge their moral and financial support, AGA will soon put into operation the first unified public relations program ever attempted by the gas industry on a nationwide scale.

The program package was given its final wrappings in early February by the public relations committee under the direction of Ernest R. Acker, president of the Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y., and was forwarded to member companies with a pledge form. What happens next depends on the support given by these executives. For unless pledges are received from companies representing at least 60% of total revenues *from ultimate consumers,* this blueprint for better public understanding of the industry will merely gather dust in AGA files.

Committee members, however, have good reason to be optimistic over prospects of support, since in a preliminary survey more than 85% of respondents favored a national PR scheme of this nature.

The plan includes operations at the two levels, national and local, somewhat after the fashion of coordinated promotions. Most of the activity, in fact, will be local, but it will be coordinated with a national plan and will be carried on with whatever help from national headquarters the local unit may desire.

The so-called "nine-point" program will start with a logical activity—the determination and evaluation of public attitudes. Currently available surveys will be studied and new surveys will be launched; and these may be repeated as the need arises. Meanwhile, the machinery of getting the other eight activities into gear will be started. Regional meetings and workshops will be conducted, public relations materials will be exchanged, companies will be assisted in planning special events, "how-to-do-it" manuals will be prepared—all to stimulate local activity. AGA's public information experts will begin channeling to member companies articles, illustrations, facts, ideas, and background information for local release—material that will help acquaint communities with the job the company and the industry are doing.

To enlist employees' support through employee information programs on economics of the industry and American business, the staff will act as a clearing house and will supply basic economic data.

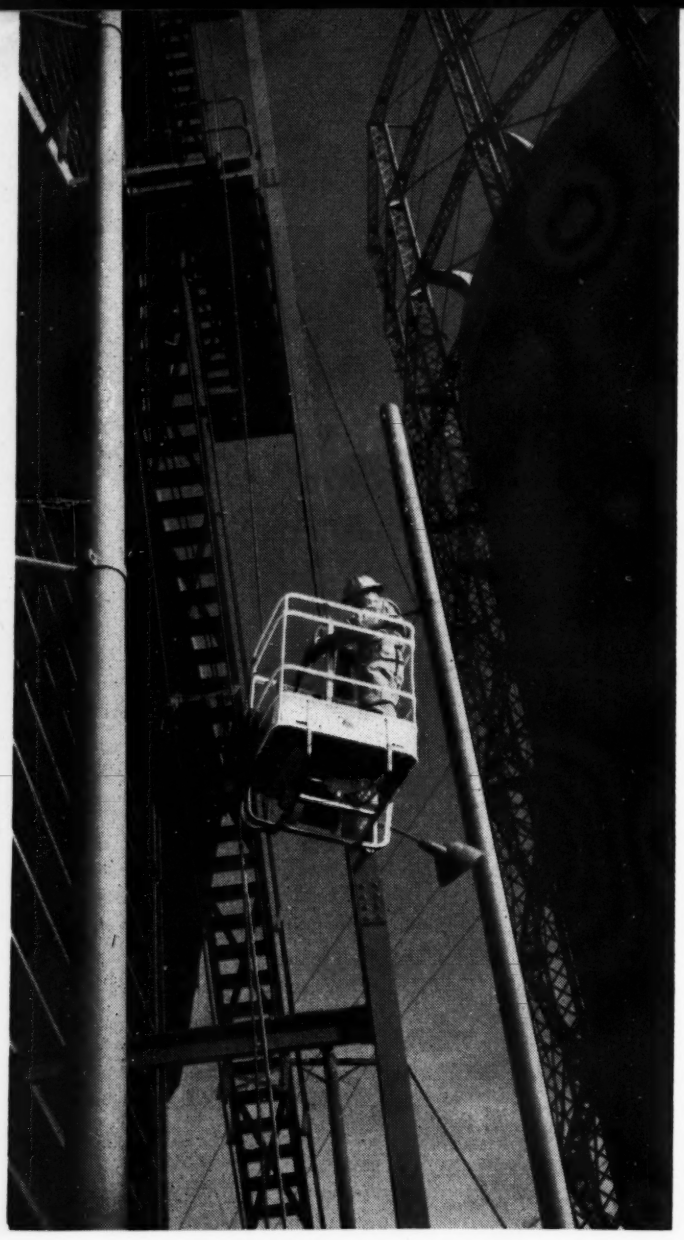
Two spheres of activity will be on the financial side. To inform the public on the economic and financial needs of the industry, special materials will be worked up for editors and commentators, speakers will be provided for national meetings of other organizations, films and publications will be supplied at low unit cost, national observance of a gas industry event will be actively promoted. To encourage investment in gas securities, greater effort will be made to keep investors informed and more time and money will be spent in working closely with securities analysts and financial organizations.

With full realization that the gas industry's main job is still to sell its product, the idea of gas as an ideal fuel will be presented in a number of ways. More stories about gas itself, increased efforts to work with key opinion-forming groups, field trips by household and equipment editors to interesting centers of gas activity, increased local industrial and commercial publicity, local demonstrations, and wider dissemination of information on the industry's safety measures are all scheduled as means of boosting the fuel itself.

Locally and nationally, the staff will also work closely with educational institutions to convince the all-important younger generation of the superiority of gas. Last activity on the list is the opposing of the encroachment by government in the field of private enterprise.

In authorizing and setting up the program, the board of directors and the committee were moved to action by the realization that the fabulously growing industry long ago outstripped its limited public information program. With a budget of only $55,000, and with no real authority to speak on many matters of nationwide importance, the association has tried to be the national voice for a multi-billion-dollar industry.

The proposed budgets—$155,000 in the first year, $255,000 in the second year, and $355,000 the third year—are still expected to cover only a minimum of activities. But with this beginning, the association hopes to impress upon the public that gas is playing a vital role in the nation's progress and in its national defense effort, and that it is meeting this responsibility now and is planning for the future. It hopes, too, that it may encourage favorable recognition by both consumer and regulatory body, and that it may acquaint the public with the many problems and phases of operation that up to now, for the rank and file, have remained a major business mystery.

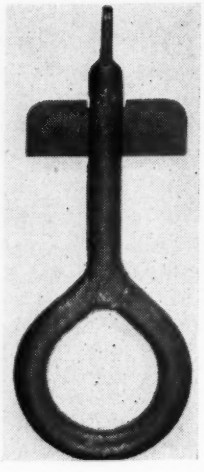


The "spider" takes to the air. These highly maneuverable cages have made holder repairs at SoCal easy and safe.

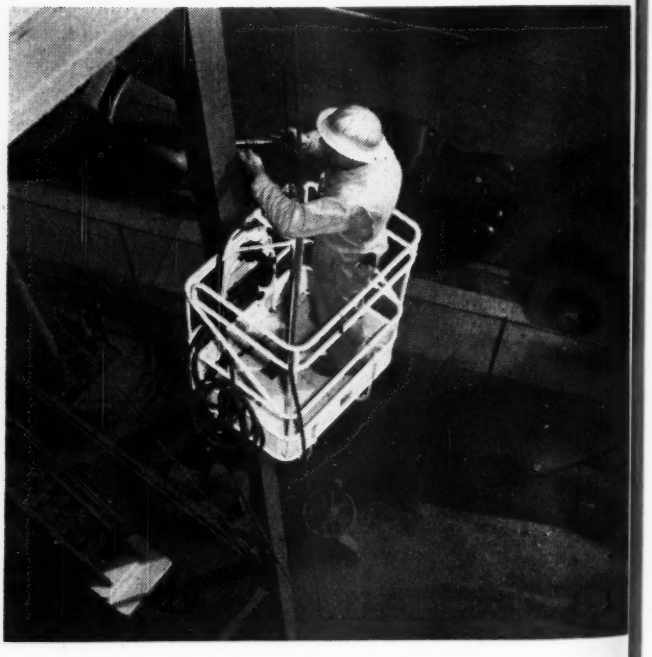
Spider staging units replace bos'n chair

The picturesque but uneasy bos'n chair used so long for high work at Southern California Gas Co. is now passe, and in its place is a safe, easily maneuverable apparatus known as the "Spider Staging" unit.

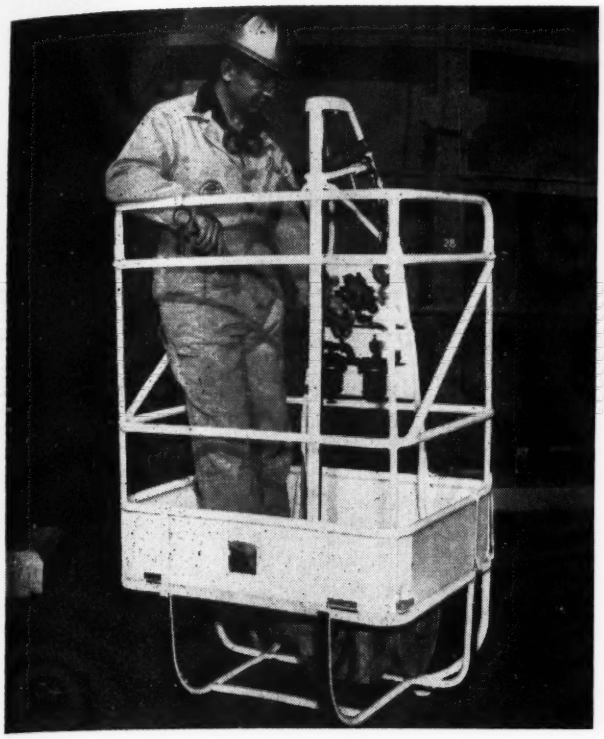
Nowadays when maintenance men are called upon to perform chipping, calking, painting, or other repair jobs on the huge gas holders that dot the Los Angeles landscape, they take to the air in one of these trim cages. Used singly or in pairs joined by a sectionalized walkway, the spiders can accommodate either one or two men and can be maneuvered laterally as well as vertically.



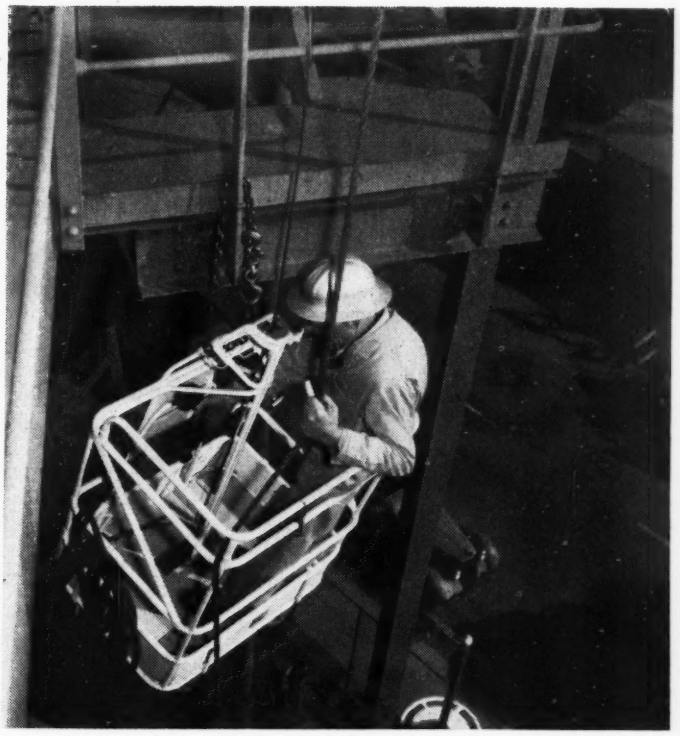
Each cage is suspended from an eye-bolt such as this. Holes were drilled at convenient points on walkways; the bolt is slipped through and held securely by the notched key.



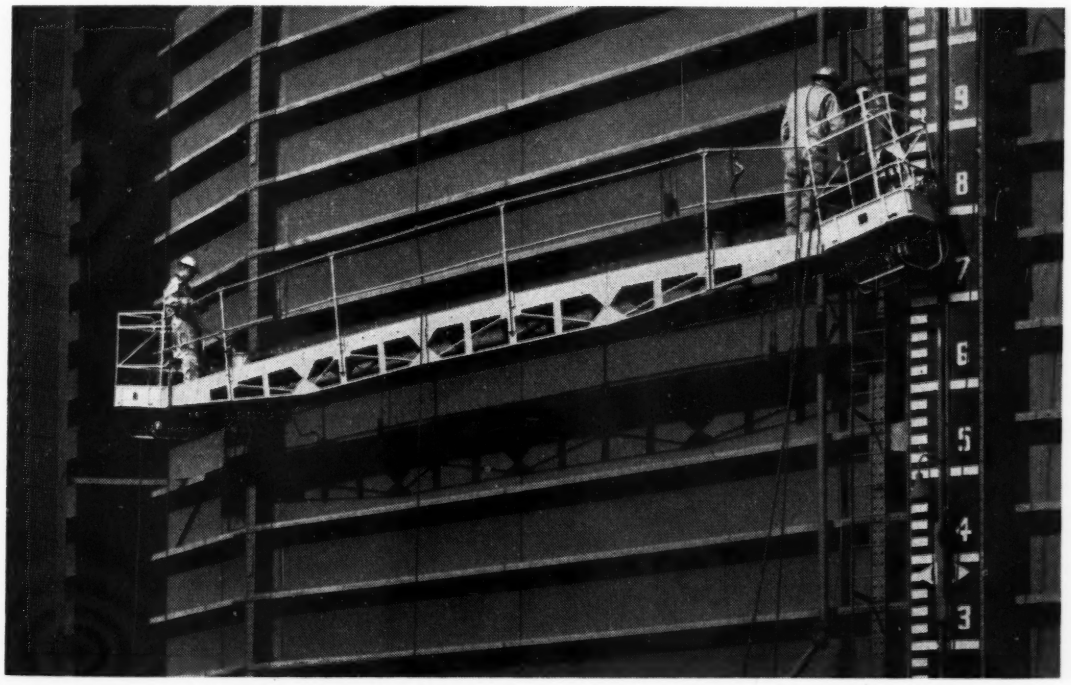
Another application of the chain. Here workman has hooked chain to post but kept cable taut.



On the ground and ready to go upstairs. Operator is ready to take off on an easy, gentle ascent. The valve handle on which his hand rests controls the air supply for lifting or lowering the cage. The fitting immediately below the valve is the takeoff for air supply to equipment such as chipping hammers and pneumatic calking guns. All air needs are thus provided by a single hose from the ground. Beneath the cage is a small Ingersoll-Rand air motor and the drum on which the 350-ft cable winds. Should air supply fail or cage descend too rapidly, a safety lock will brake it.



Using the transfer chain. Maneuverability and stability are both afforded by the short length of chain. In this instance, operator has hooked chain to stanchion and slackened off slightly on the cable. This secures the cage to the landing. Rope to which he clings is a life line, required by law. Chain can also be used to "walk" the cage laterally; operator can hook it in place ahead of the spider, take off the slack on the cable; the cable position can be changed, the chain can be moved once more, and so on, in a sort of "hand-over-hand" procedure.



Two cages joined by a walkway. In this application, 8-ft bridge sections have been bolted together and joined to the two cages. Any number of sections can be used until the total suspended equals 2000 lbs (in actual practice about four). Paint cans are hooked securely to stanchions, and chipping tools and brushes are conveniently suspended from railing. Transfer chains at either end are hooked to the side of the holder and cable is slackened just enough to hold assembly snugly against the big tank.

Electrical measurement of corrosion rate

Bureau of Standards' new method for determining weight loss obviates need for visual inspection.

A RECENT laboratory study by the National Bureau of Standards proves for the first time that the rate of weight loss of a piece of steel corroding normally in soil can be measured electrically, without actually weighing the metal.

Conducted by W. J. Schwerdtfeger and O. N. McDorman of the NBS corrosion laboratory, the study gives further evidence that the electrochemical theory of corrosion applies generally to soils. Although the NBS measurements were restricted to the laboratory, the success of the work suggests the possibility of valuable practical applications, such as determination of the corrosion rate of a tank or other underground structure without the need for visual inspection.

Basis for technique

When iron or steel is exposed to the soil, local differences in electrical potential develop at the surface of the metal, resulting in the formation of numerous small corrosion cells. This means that electric currents flow through the soil from certain areas (anodes) to areas of less negative potential (cathodes), with accompanying discharge of hydrogen ions at the cathodes and loss of metal from the anodes. By Faraday's law, the rate of weight loss from corrosion is proportional to the current.

The NBS-demonstrated measuring technique is based on a relation established by other investigators, who showed that the current in a corrosion cell can be expressed in terms of the values of anodically and cathodically (positively and negatively) applied direct current, from an external source, that will just reduce the cell current (corrosion current) to zero. The relation is

$$i_o = \frac{I_p \, I_q}{I_p + I_q},$$

where i_o is the corrosion current, and I_p and I_q are, respectively, the cathodically and anodically applied currents required to reduce the corrosion current to zero. As increments of current are applied, the potential of the cell changes. When the measured potentials are plotted against the applied currents, a change in the slope of the curves usually marks the points (I_p and I_q) at which the applied currents have reduced the local corrosion current to zero.

Indirect determination

The corrosion cells used by previous investigators in confirming the equation experimentally contained separated anodes and cathodes, so that I_p and I_q could be directly measured and the corrosion currents computed therefrom compared with values obtained by direct measurement. However, when a single piece of metal is exposed to a corrosive medium, as in the NBS study, it is obviously impossible to measure these currents directly. Here the corrosion current, made up of innumerable small cell currents, must be determined indirectly, if at all, from changes in slope of the current-potential (polarization) curves. The NBS study demonstrates for the first time that the total corrosion current i_o—and thus the weight loss—of a single piece of metal normally corroding in soils, and presumably in other aqueous media, can be determined by the equation, from values of I_p and I_q obtained from the changes in slope of the cathodic and anodic polarization curves.

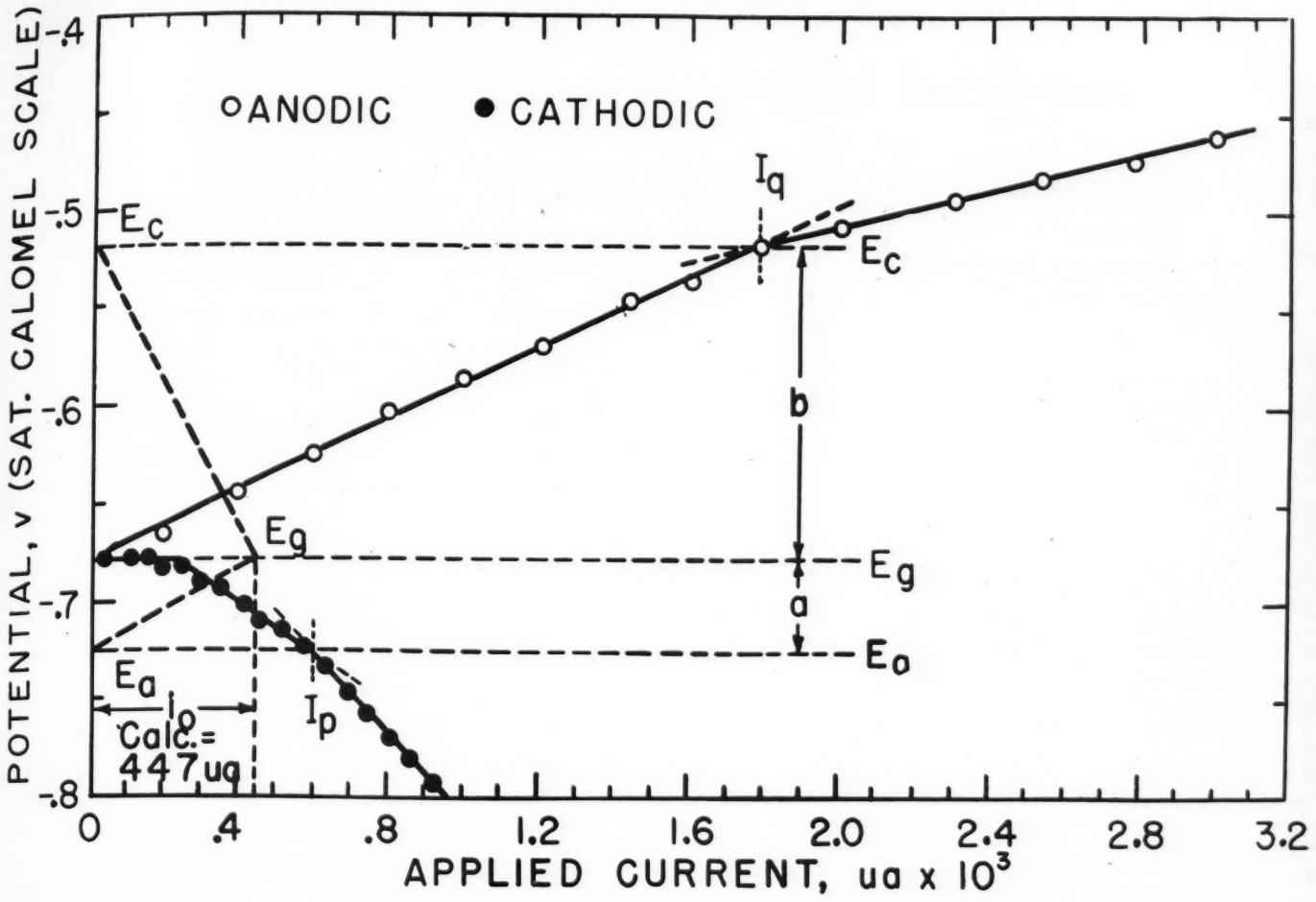
In establishing the feasibility of the indirect measuring technique weighed steel specimens, differentially aerated, were exposed at the bureau to five corrosive soils for approximately two months. The soils ranged in reaction from very acid (pH 2.9) to very alkaline (pH 9.6). Because of the possibility of changes in rates of corrosion during the two-month period, polarization curves were obtained at intervals throughout the exposure period. At the end of this period the specimens were removed from the soils, cleaned, and reweighed. Actual weight losses were compared with weight losses calculated indirectly by Faraday's law, using values of corrosion current (i_o) obtained from the equation on the basis of values of I_p and I_q indicated by changes of slope in the polarization curves. The calculated values of weight loss differed on the average from the actual values by approximately 4%.

Extensive applications

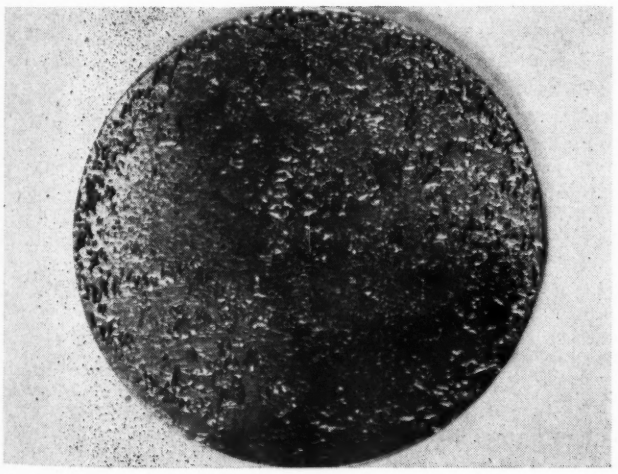
This technique for indirect electrical measurement of corrosion rate appears to have possibilities for extensive application both in the laboratory and in the field. In laboratory determinations of the corrosion rate of certain materials for instance the weight loss resulting from corrosion might actually be exceeded by the cleaning error. The electrical method makes possible much more accurate comparisons of the corrodibilities of such materials.

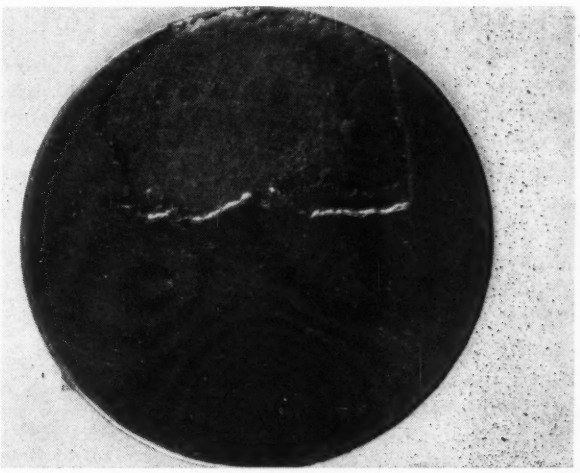
For field determination of underground corrosion, the electrical method if it proves practicable in the field as well as the laboratory, would have several advantages in addition to obviating the need for excavating the underground object. Although in some soils ferrous metals corrode at a constant rate year after year, in other soils corrosion gradually slows down and in time may virtually cease. Actual weighing or inspection of an object that has been buried for years will indicate how much total corrosion has occurred, but will not show how rapidly, if at all, it has been corroding just prior to inspection. The electrical method, on the other hand, measures the present corrosion rate, which is likely to be of greater practical interest than the history of past corrosion. Furthermore, the electrical method does not involve the removal of corrosion products, which often inhibit corrosion.

For further technical details, see "Measurement of the Corrosion Rate of a Metal from Its Polarization Characteristics," by W. J. Schwerdtfeger and O. N. McDorman, *J. Electrochem. Soc.* 99, 407 (Oct. 19



Polarization curves of a steel electrode exposed to a certain soil. The curves are typical of ferrous materials corroding in soils. Potentials were measured with an electronic interrupter in conjunction with a potentiometric circuit. Significant changes in slope of the curves occur at values of applied current I_p and I_q. After the value of the corrosion current i_o has been calculated from I_p and I_q, the triangle connecting points E_c, E_g, and E_a can be completed. The line E_c-E_g then represents the hypothetical polarization of all the cathodic elements, and the line E_a-E_g applies similarly to the anodic elements; these lines show whether the reaction is cathodically or anodically controlled. The current I_p is the value required to prevent corrosion, commonly known as the current needed for cathodic protection. This current was found to bear a relatively fixed relation to the corrosion current i_o, so that the latter can be estimated from the former.





Steel specimens exposed to soil corrosion for two months in the National Bureau of Standards corrosion laboratory. The specimen on the left was exposed to acid soil (pH 2.9), that on the right to alkaline soil (pH 9.5). The study demonstrates that the rate of corrosion of laboratory specimens can be determined indirectly by electrical measurements.

New gas-fired furnaces speed sucker rod production

By **D. R. DALE** • S. M. Jones Co., Toledo, Ohio

The use of these efficient high-speed gas furnaces has made possible increased production of sucker rods with better forging and machining properties.

THE manufacture of oil well sucker rods is a highly critical process. Experience has shown that the stock must have minimum scale for best forging and minimum decarburization for best machining. Hence, the most critical operation of all in this process involves the heating for forging.

This is where gas comes in. By developing high-speed gas-fired forge furnaces, manufacturers not only have been able to turn out sucker rods faster, but they have been able to make many improvements in quality.

Today, there are over 400,000 active oil wells in the United States. The depth of these wells averages over 3600 ft. Pumping oil from these wells involves the use of a sub-surface plunger type pump, the barrel of which is attached to the bottom of the oil well tubing. The plunger is attached to the bottom end of a long thin string of steel rods (sucker rods). The reciprocating motion of the rods and plunger within the tubing and the pump barrel lifts the oil to the surface.

In the manufacture of these rods, hot rolled carbon or alloy steel stock is used. The stock is first straightened, heated and upset, then normalized and machined. For best results, bars must be brought to heat in a minimum of time and the heated bar must be ready for the forge operator at just the right temperature and moment. Overheating will produce a "sagging" bar with excessive scale and decarburization and underheating will necessitate costly reheating.

These requirements present a manufacturer with some tough production problems, as customers for this highly specialized type of equipment are very exacting.

For a number of years, conventional gas-fired slot forge furnaces were utilized at the S. M. Jones Co. of Toledo, Ohio, with limited success. Production rates were adequate but results from rod to rod were inconsistent and either excessive scaling or decarburization was often encountered and production costs were excessively high owing to rejects and die maintenance.

Eventually, Surface Combustion Corp. was called upon to design and develop a special unit applying the advantages of high speed gas heating to these problems. Initial specifications required maximum production with uniform heating and minimum scaling or decarburization of stock sizes ranging from ⅝ to 1 in. in diameter and heated ends from 12½ in. to 17½ in. on bars up to 30 ft long.

A new high speed gas heating design was developed incorporating a split side wall heating chamber with gas-fired line burners firing vertically downward into a refractory bed hearth. In simple language, the new design was basically a slot forge furnace with the conventional refractory-lined side walls and side firing burners eliminated. Straight-through travel of the bars was thus made possible and the resulting compact unit design proved readily adaptable to automatic feeding. (See *Fig. 1.*)

To concentrate maximum heat in the working area of the hearth surface, there is a bed of refractory material extending the length of the hearth under each of the line burners. (See *Fig. 2.*) This arrangement maintains extremely high rates of combustion by completely burning the gases in the narrow confines of the working hearth. With this method of firing, the rod ends are rapidly heated not only by the hot products of combustion but also by radiation from the incandescent refractory bed. This is a remarkable accomplishment in the face of the inherent heat losses caused by radiation through the open sides of this type of heating chamber.

After four of these new furnaces were initially placed on the line, it became evident that, in addition to marked production increases, general working conditions and overall operations were also improved. Production runs proved that design calculations on these furnaces were considerably exceeded and the maximum production rates shown in *Table 1* were achieved. Continuous production also resulted in a high fuel efficiency (about 14%) for these furnaces.

The heating rates alone involved an increase of between 60 and 70% over those attained in the conventional slot forges that were replaced. In addition to increased rates there was a marked reduction in rejects from the actual heating and upsetting operations. These rejects, caused by such conditions as poor metal flow and non-uniform filling of the dies, were cut to 0.3% from a previous average of 1 to 1.5%.

Rejects caused by poor machining characteristics were also considerably reduced because of decrease in depth of decarburization resulting from high speed heating. The extent of this decarburization is critical in machining operations since the machine-threaded connections on these sucker rods must stand up under terrific punishment. Therefore, the threads must be uniform and the rods machined to shoulder perfectly. If they do not shoulder perfectly, the connection will loosen and breakage will occur.

Die maintenance, which can often prove a costly item, was considerably decreased. The previous daily die grinding

TABLE 1. MAXIMUM PRODUCTION RATES WITH HIGH SPEED GAS HEATING

Work at 2250° F	⅞-in. diam.	¾-in. diam.	⅝-in. diam.
Rods per hour	173	167	167
Conveyor speed	6.48 in./min.	6.26 in./min.	6.26 in./min.
Rod temperature	2230° F	2220° F	2240° F
Mixture pressure	28 oz	20 oz	26 oz
Heating rate	3.17 min./in.	4.6 min./in.	3.83 min./in.
Heated end - in.	13½ in.	15 in.	16 in.

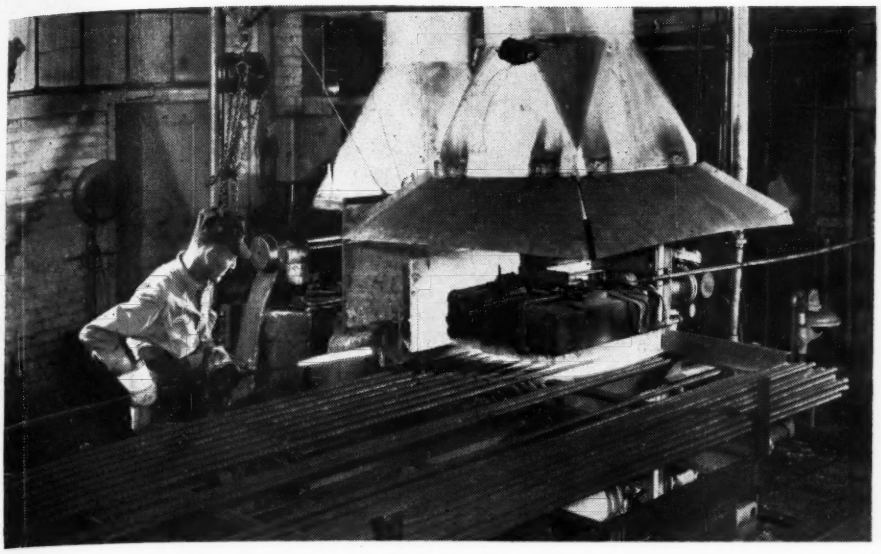


Fig. 1. Close-up of the new high-speed end heater showing burner arrangement and chain conveyor movement of sucker rods. The gas-fired line burners fire vertically downward into a refractory bed hearth, making it possible for the rods to pass automatically straight through the furnace.

was reduced to one grind every three days on the same set of dies. This was owing in considerable measure to the high heating rate, about 3.83 minutes per in., obtained in the high speed units. The visible scale alone was reduced in thickness by about two-thirds.

Each high speed end heating furnace is rated at 2600° F hearth temperature. Each bar end is uniformly heated to a forging temperature of 2200-2250° F, as required. Horizontal travel of 22 in. (effective hearth length of 18 in.) is accomplished under direct flame contact from the water cooled line burners and also by radiation from the incandescent refractory bed. The impact combustion imparted to this refractory bed transforms this surface into a radiant burner face. The high velocities of the burning gases as they spread out on contact with the refractory material, so accelerate combustion that contact of partially burned gases on work surfaces is minimized.

Transfer by convection also becomes a critical contributing factor in this arrangement because of the velocities attained in this type of combustion heat. It is reported from calculations that up to 15 to 20% reductions in heating time over a condition of pure radiation are attributable to this supplemental convective effect. Further application of the well-known fact that heat is transmitted as the fourth power of the temperature difference between radiant source and receiving surface makes it apparent that this burner arrangement is capable of impacting heat energy of volcanic intensity. All work surfaces are thus uniformly exposed without shadow effect or cold spots. Evidence of this is borne out in the high heating rates attained *(Table 1)*.

Natural gas, at the rate of 2200 cu ft/hr under 48-oz pressure, and combustion air, at 1100 cu ft/min. and 40-oz pressure, are introduced to a variable orifice mixer located below the furnace hearth. *(Fig. 2.)* Central gas and air compressors are manifolded to all four furnaces.

Ratio of fuel and air in this mixer is controlled within very close limits, over a wide range of turn-down, by means of an adjustable plate. Simple operation of a single screw opens one orifice while simultaneously closing the other. The resulting combustion mixture is manifolded to the water cooled line burners at about 30-oz pressure.

Individual burner manifolds are connected to a single header equipped with a rupture disc. This disc is arranged so as to divert any manifold disturbance upward and away from the operator and mixing equipment. The header also contains a section of flexible corrugated tubing that permits normal expansion and contraction without interference to mixture piping. This compact construction eliminates the need for firechecks and premixing machines.

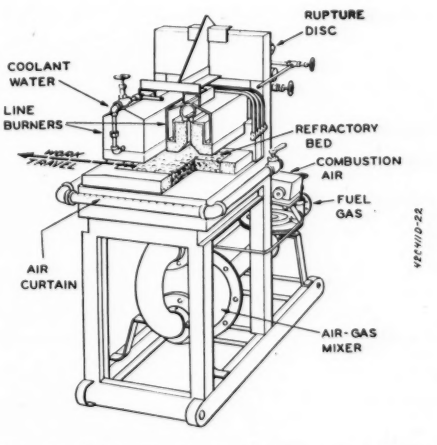


Fig. 2. Diagram of the heater unit. Note the bed of refractory material extending the length of the hearth.

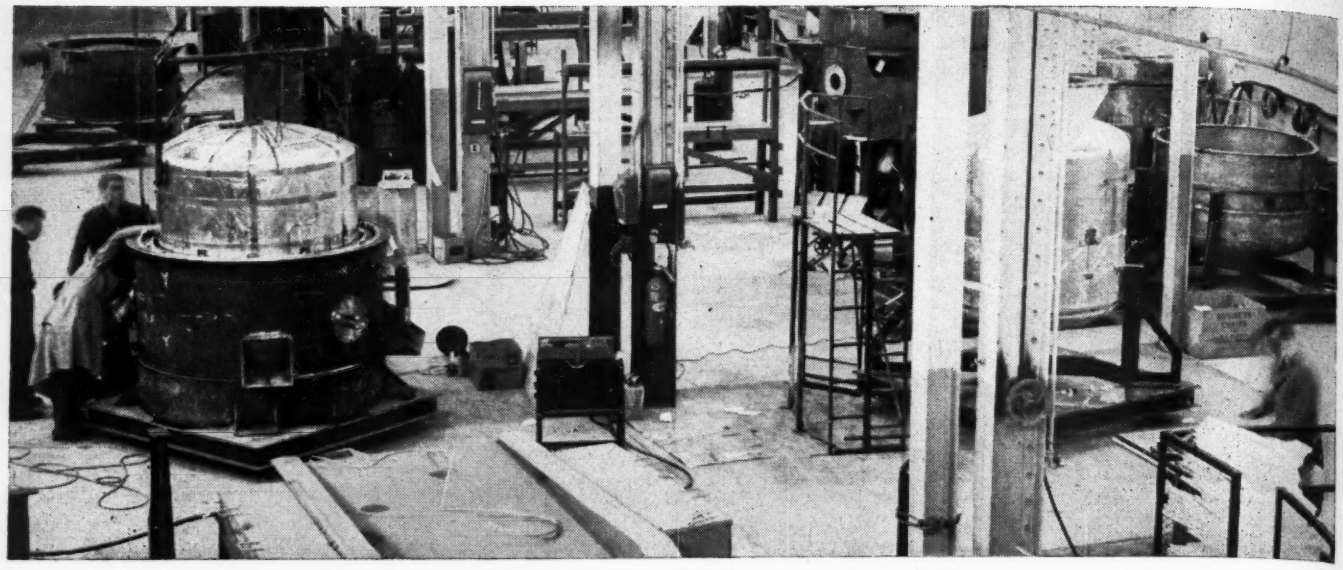
Safety control equipment includes an electrical safety interlock system that operates a shut-off valve in the gas line in case of gas, air, or water pressure failure.

A range of stock sizes is handled with the only necessary adjustments being changes in conveyor speed for each stock size *(Table 1)*. These stock diameters vary from 5/8 in. to 1 in. in lengths up to 30 ft. Conveyor spacing is 2¼ in. for all stock. Since uniformity of heating is assured, each and every bar in a run is exposed to the same amount of heat and operator errors are thus eliminated.

The simplicity of operation is appreciated by the forge operators. Lighting up is simple and operator attention during production is practically nil. The high speed furnaces are up to temperatures and ready to operate in about 10 minutes. The previous conventional furnaces required about an hour.

The compact size of these units has also made possible the elimination of some previous stock handling operations. The new furnaces occupy a floor space of 13.2 sq ft with a 2-ft front width. The old furnaces, which were also placed as close to the upsetters as possible, required 29 sq ft and a 5-ft 2-in. width across the front. With the old furnaces it was impossible, because of this width, to move stock directly from the storage racks in the back of each furnace without an additional time consuming transfer operation. Now, owing to the narrower width of the high speed units, larger rack loads can be moved by transfer car directly from storage rack to furnace conveyor. This results in a considerable saving in time and manpower, which, of course, is vitally important in mass production on a piece-work basis.

Operator comfort is also good. "Sting-out" from the hearth is prevented by air curtain and cast refractory shield, and heated stock is automatically fed to the operator close to the upsetter. Tiring movements are thus minimized. During the shutdowns common to any forge shop, the operator merely withdraws bar stock from under the burners and replaces it on transfer car until operation resumes.



Transition engineering in action. These men are assembling a dewar in connection with a government project calling for design, manufacture, and testing of large capacity dewars for the transport of liquefied gases at low temperatures.

Closing a gap between lab and production

"Transition engineering" may help speed one phase in the development of both equipment and appliances.

FOR years, industry has been searching for a way to bring research and production closer together so that new products and equipment can be put on the market or into use in the least possible time and at minimum cost.

A new Massachusetts company, the Cambridge Corp., seems to have come up with one answer in "transition engineering and manufacturing."

Organized jointly by Arthur D. Little Inc., one of the country's largest industrial research and engineering organizations, and Carrier Corp., the well-known air conditioning firm, this new company offers, for the first time, specialized engineering and manufacturing facilities and personnel specifically organized to bridge the gap between a research and development engineering program on the one hand and production in large-scale quantities on the other.

In the past, this gap has been a big problem for all industry, the gas industry included. AGA has been deeply concerned with the situation for a number of years. A research program is costly enough and often consumes unpredictable amounts of time, but the next stage, that between the development of the prototype and large-scale production of finished units, can be equally unpredictable in cost and time. Unhappily, this phase has been a neglected part of modern industrial development.

Historically the term "transition" or "transition engineering" first came into use in industrial terminology during the early period of World War II. At that time it became apparent to the organizers of government research that some means must be found to get into production small quantities of custom made apparatus and equipment without disrupting already overloaded production lines and facilities.

To do this the National Defense Research Committee organized what was then known as the "Engineering and Transition Office," whose job it was to set up a program to insure that limited quantities of unique equipment would be manufactured on schedule. Their problem was not easily solved since there were no facilities organized solely for this type of manufacture.

An excellent example of the importance of transition engineering during the war period is seen in the development of the Napalm flame thrower by the NDRC staff. The transition problem was to prove that jellied gasoline could be effectively used as the flame agent in a flame throwing device and, at virtually the same time, to develop manufacturing methods, first for the initial test units and then, pending successful test results, for mass production.

The transition office carried this entire program from prototype to finished weapon by first utilizing specialized facilities for limited production of the prototype. The next step was to field test these initial units. Following this test phase, results were analyzed and the necessary re-engineering accomplished so that redesigned units could be manufactured in a limited quantity for further test. In this way, step by step, the transition was made until finished drawings and specifications were completed and a mass-producing company could carry out the final manufacturing.

This logical step-by-step process of manufacturing development is the real value of transition engineering through specialized facilities.

The gap that exists between research and development engineering and production is most aptly illustrated by discussing the prototype. The first unit is generally a hand made, costly device or piece of equipment that has been painstakingly built to test an idea. It represents to the designers and builders a potential product and profit, or opens up a whole new field for research. In most cases more than one unit is desirable to make possible a wider experience in testing that will facilitate a better assessment of the merits of the unit. To produce these units in the original manner is a time-consuming and costly process. The manufacture of a number of reproductions of the prototype is the specialty of transition manufacturing.

The importance of the post-manufacturing problems of the transition cycle in equipment development must also be emphasized. A major part of the overall program must include a comprehensive test program either in the shop or under field conditions. Specialized training of operators and service personnel takes place along with the test program. The inclusion of a final systems study to determine the value of the manufacturing methods and the equipment's performance serves to substantiate the final test results. And finally, the preparation of operating and service manuals completes the transition cycle.

Transition manufacturing not only encompasses the first phase of development but carries the program one step further, since, as a result of the initial phase, large-scale manufacture of the equipment or product may be indicated. It is an equally important part of transition manufacturing to redesign and adapt the prototype for this purpose.

The need for an organization staffed and equipped to perform work within this transition area was realized by the parent companies of Cambridge Corp. when they undertook to accomplish a vital government project. The problem was to design, manufacture, and operate in the field a number of large capacity helium refrigerated dewars or refrigerated thermos bottles for the transport of liquefied gases at very low temperatures. This project indicated the need for the specialized research and development experience of one organization and the manufacturing experience of the other and, in effect, was an ideal example of what transition engineering and manufacturing is.

The prototype was, in a sense, the Collins Helium Cryostat, a laboratory device designed to enable science to test material and other matter at temperatures close to absolute zero. The transition problem was to expand the principles of this laboratory device into a large-scale field model without benefit of intermediate development. The successful solution of this transition problem involved unique systems of internal support, new methods of thermal insulation and the full utilization of vacuum equipment and technique.

Given this start, the full staff and facilities of this organization concentrated on the manufacturing, design, and field operation problems of the project up until June 1952. As the project neared completion the full value of an organization that combines the fundamentally different talents of engineering development and production became apparent as the unique combination of development and manufacturing personnel paid off in on-time delivery dates and a well designed and efficiently manufactured unit.

This initial success convinced the management of Cambridge about the real value of transition manufacturing and they are continuing to concentrate the work of their mechanical division in the transition field. Cambridge is now applying these new methods to the gas liquefaction field, which can fully utilize its vacuum and low-temperature equipment. Oxygen and hydrogen generation, liquefaction, and storage problems now are also under way. In electronics, work is progressing in the adaption of electron microscope design to large-scale manufacturing techniques.

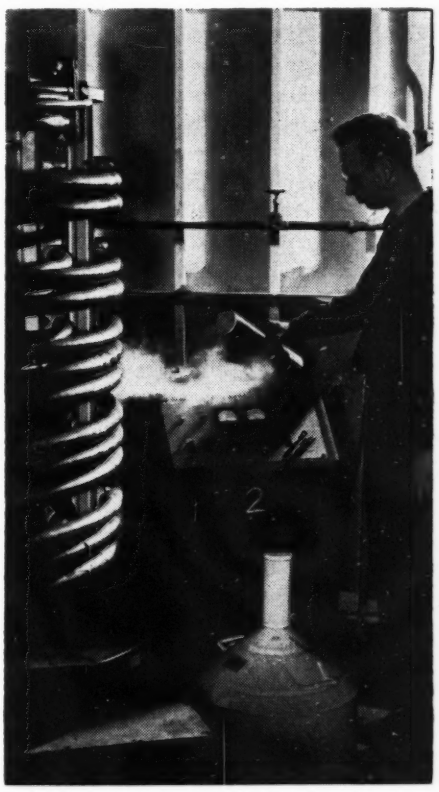
At present, Cambridge plans to limit its work to electronics, high vacuum, low temperature, instrumentation, chemical engineering, metallurgical, and mechanical engineering fields.

The Cambridge plant has been planned and laid out to accomplish the transition work by using the same diversified and flexible methods that were used in the selection of personnel. Included in their tools and equipment is an experimental machine shop, diversified welding equipment, high-vacuum pumps and testing equipment, production tools for machine and metal working, and a large variety of testing equipment and devices.

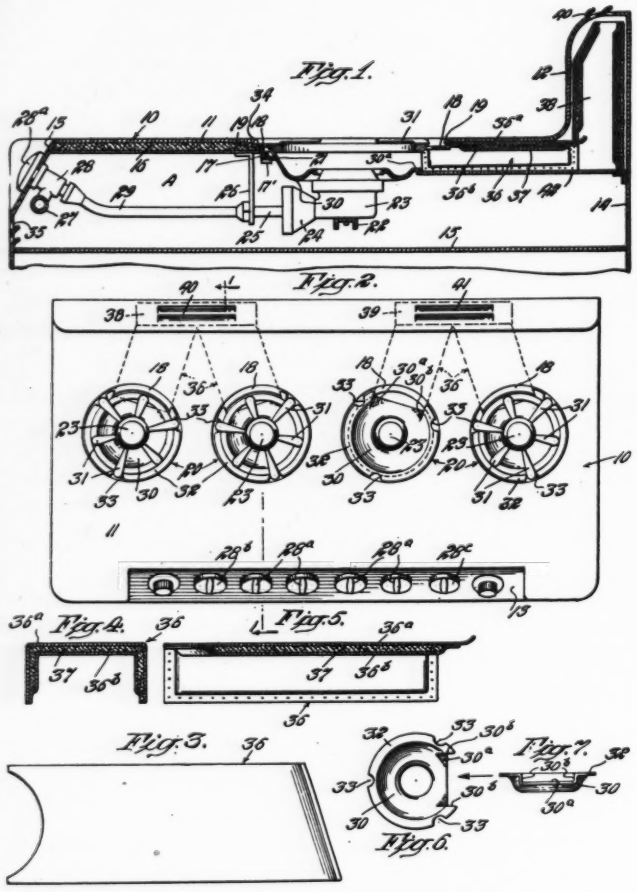
The main shop facilities occupy 30,000 sq ft of ground floor space and have headroom up to 35 ft. The area is so laid out that jobs from bench work to large-scale assemblies can be done side by side. Close contact between the shop and engineering is maintained by the utilization of mezzanine office facilities.

By carefully planning the balance between specialized facilities and personnel, Cambridge has been able to reduce appreciably the cost of transition work. The introduction of methods engineering and standardization procedures to small-scale and varied manufacture has resulted in the reduction of fabrication and assembly time in the shop. By reducing the cost and time of reproducing a quantity of prototype for instance, more units may be made within a given budget, thus increasing the possibilities of receiving more significant results and conclusions from test programs. On the same basis, the total units manufactured may remain constant but additional time may be allotted to the test programs as a result of savings through economical transition manufacturing.

Along with these major activities Cambridge Corp. is able to undertake an entire program of research and development through its parent organization, Arthur D. Little Inc. Their manufacturing facilities are also adaptable to "specialty contract manufacturing" of equipment in the mechanical, metallurgical, electronic, refrigeration, thermodynamic and related fields, even though the transition phase has been completed or is unnecessary.



High vacuum testing using mass spectrometer techniques.



New inventions widen applications of gas

A new flush-grate range, two versions of combination gas-oil burners, a flame-retaining atmospheric gas burner, and three other types of burners have recently won U. S. patents.

A new flush-grate gas range

HERETOFORE, it has always been necessary to locate the top surface of burner grates on gas ranges above the working surface to prevent the products of combustion from being blocked off in case an over-size cooking utensil is placed over the burner.

A flush grate would be highly desirable as it would facilitate the sliding of cooking utensils back and forth from the cooking top to the grates, and also would permit cooking utensils to be positioned partly on the grate over the burner and partly on the cooking top and still be level. But, as indicated above, this arrangement is hazardous in that if over-size cooking utensils are placed over the grate, they may seal the opening. When this happens, the burner cannot receive sufficient air to support combustion and poisonous carbon monoxide is formed. This is particularly true when over-size cooking utensils are placed over each of the top burners at the same time.

Furthermore, with gas ranges having smooth cooking tops, there is always the danger that grates might be replaced with solid stove lids or that one or more of the grates might be removed in order to place cooking utensils directly over the burners. In either case, incomplete combustion would result.

Therefore, this new flush-grate range has a two-fold purpose: to make possible a gas range with a flush cooking top with means provided for supplying adequate air to the burners to assure complete combustion and for conveying the products of combustion away from the burners without appreciably heating the top surface of the range.

It operates in this way:

Should any or all of the burners be completely covered, adequate air for proper combustion is supplied to the burner compartment through louvers located in the front panel of the range, or in the side or rear panels. From this compartment, primary air flows into the mixing tubes of the top burners and secondary and excess air flows from the compartment upwardly through the center of the burners and through the space between the burners and the heat reflectors. Thus complete combustion is assured at each of the burners, even though all of the openings above the burners are sealed off. The products of combustion are carried off through the trough-shaped portions of the heat reflectors, into and through the horizontal flues and through the vertical flues in the back guard, thereby producing a chimney effect that causes more fresh air to be drawn in through the louvers. The flues are so formed and insulated that hot products of combustion passing through them do not transmit any appreciable amount of heat to the top panel.

Referring to the drawing, *10* designates generally the cooking top of a gas range, provided with a top panel or working surface, *11*; a back guard, *12*; a front or console panel, *13*; a rear panel, *14*; and an inner panel, *15*. The panels *11*, *13*, *14* and *15* cooperate with end panels (not shown) to form a closed top burner compartment A. The top panel *11* is provided with a suitable heat insulating material, *16*. Four circular openings are provided in the top panel, *11*, and are each formed with a vertical flange, *17*, a horizontal flange, *18*, and a second vertical flange, *19*. Flanges, *17*, are each provided with three spaced lugs or ears, *17'* (only one of which is shown).

Four generally similar top burner assemblies, *20*, are located in compartment A with one burner assembly arranged centrally of each of the four openings in

the top panel, *11*. Each of the burner assemblies includes a burner-supporting ring, *21*, supported by lugs, *17'*, and provided with a stirrup, *22*, adapted to receive and removably support a burner, *23*, at two points. The burner, *23*, is provided with a conventional mixing tube, *24*, having an air shutter in the front end thereof. This air shutter is provided with a central opening (not shown) adapted to receive a gas nozzle, *25*. The gas nozzle, *25*, which is supported by an angle member, *26*, acts as a third support for the gas burner, *23*.

Each of the top burners is supplied with fuel gas from an manifold, *27*, provided with gas valves, *28*. Gas tubes, *29*, connect the valves, *28*, with the nozzles, *25*. Each of the gas valves is provided with an operating button or handle, *28a*.

Each of the top burners is provided with a combined heat reflector and drip pan, *30*, and with a grate, *31*. As shown, the heat reflectors, *30*, are each formed with a peripheral flange, *32*, which is adapted to rest upon one of the flanges, *18*, of the top panel. The flange, *32*, is provided with three semicircular notches, *33*. The flanges, *18*, are each provided with three openings adapted to receive three lugs, *34*, (only one of which is shown in *Fig. 1*) formed on each of the grates, *31*. The arrangement is such that the heat reflectors, *30*, as well as the grates, *31*, are interchangeable and when they are properly positioned in the top panel, the peripheral flange, *32*, of a heat reflector rests upon a flange, *18*, and a grate rests upon flange, *32*, with the spaced lugs, *34*, of the grate passing through the spaced notches, *33*, of the flange, *32*, and into the spaced openings in the flange, *18*. By this arrangement, the heat reflectors and grates are properly located and centered relative to the top burners and are still readily removed for cleaning.

The heat reflectors, *30*, are each formed with a scoop or trough-shaped portion on one side thereof. This trough-shaped portion is formed by stamping or pressing one side of the reflector to form a horizontal bottom, *30a*, and two vertical side walls, *30b*. The arrangement is such that in case an over-size receptacle is placed upon one of the burner grates, thereby blocking off the opening above the burner, the products of combustion pass from the burner through the trough-shaped portion of the heat reflector into horizontal flues, *36*.

—Robert S. Taylor, Evansville, Ind., assignor to Servel Inc., New York. Patent 2,611,358.

Flame retaining atmospheric burner

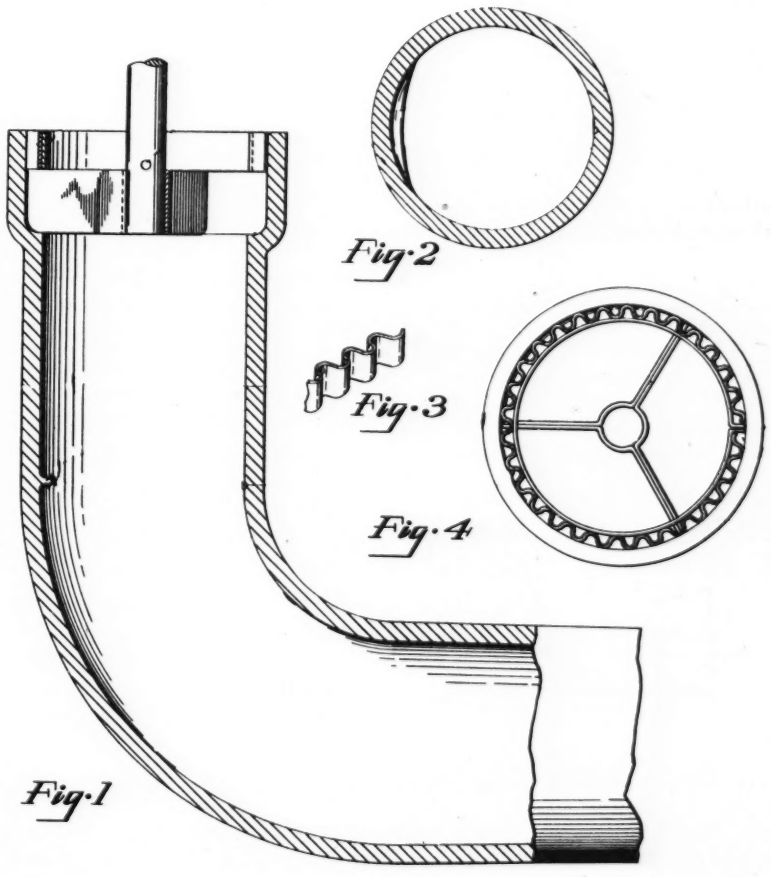
This invention relates to gas burners, particularly to those known as "atmospheric," wherein a primary mixture of gas fuel in insufficient air for complete combustion emerges from the burner mouth, and combustion takes place beyond the mouth in the surrounding atmosphere from which sufficient additional air is had for completion of combustion.

More particularly this invention relates to such atmospheric burners, of the specific type known as single-port, self-piloting, flame-retention character, wherein the primary mixture has discharge in a single principal and relatively large stream, through a head having a mouth about which means are provided for piloting the main stream at low turn-down and for retaining the flame of the main stream on high turn-up.

The invention is thus directed to the discharge or head end portions of an atmospheric gas burner. Objects of the invention are, briefly, to provide a burner having the specific characteristics described, of superior operation, and simple and inexpensive construction.

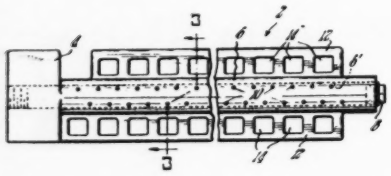
The invention contemplates employment of what is known as a ribbon type of construction in attaining the above objects. Also as is well understood in the art, a flame spreader is often employed in connection with the type of burner contemplated, the spreader being located in spaced opposite relation to the mouth of the burner head.

—Edward R. Downe, Elyria, Ohio, assignor to the C. A. Olsen Manufacturing Co., Elyria, Ohio. Patent 2,610,675.



The flame retaining atmospheric gas burner. Fig. 1 is a view generally in typical sectional elevation showing pertinent portions of a burner embodying the invention. Fig. 2 is a transverse section. Fig. 3 shows details of a ribbon part employed in the burner head assembly, and Fig. 4 is a plan view showing details of the burner head illustrated in Fig. 1.

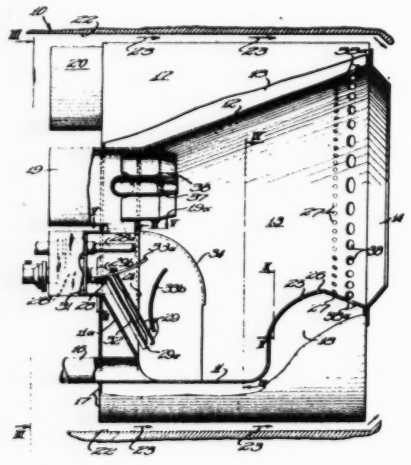
Air-cooled gas burner



This air-cooled gas burner is adapted for disposition horizontally in a combustion chamber. It is made up of an elongated burner bar having an elongated bore and provided with circumferentially spaced longitudinal rows of relatively spaced ports extending from the bore through the upper side, continuous longitudinal fins at opposite sides of the burner bar extending substantially throughout its length disposed in parallel planes parallel to a plane extending through the longitudinal axis of the burner bar, and a longitudinal fin extending down through the length of the bar disposed between the first named fins and at right angles to them. The fins are provided with longitudinally spaced ducts for the passage of air in directions at right angles to a plane extending through the longitudinal axis of the burner bar.

—Homer D. Dufault, Easthampton, Mass., assignor to Heatbath Appliances Inc., Springfield, Mass. Patent 2,621,720.

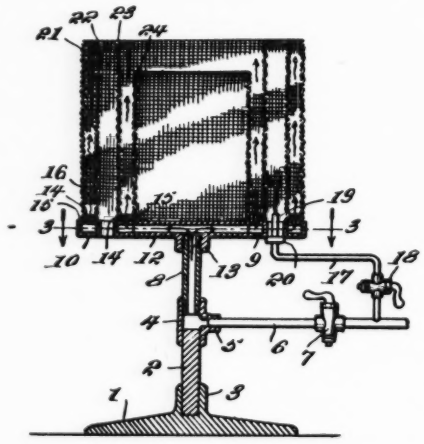
Combination gas-oil burner, horizontally fired



This horizontally-fired combination oil and gas burner unit consists of an oil vaporizer tray, a casing means that forms with the tray a vaporizer compartment with a generally horizontally disposed burner port and a forward wall opposite the burner port. It also has a gas-burner-mixer tube spaced above the tray and projecting through the forward wall to fire through the central section of the vaporizer compartment toward the burner port, an oil inlet conduit for the vaporizer tray extending through the forward wall, and a casing forming an air chamber around the vaporizer compartment. The casing means has a plurality of spaced apertures to admit combustion-supporting air from the air chamber to the vaporizer compartment.

—Cyril Charles Young, Kansas City, Mo. Patent 2,619,159.

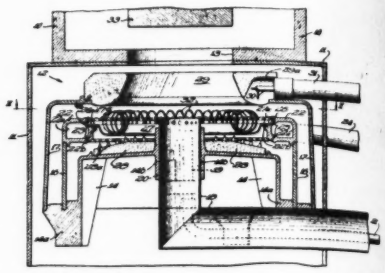
Burner with radiant foraminous combustion chamber walls



This gas burner has a horizontally disposed base adapted to be supported on a grate, a hollow boss formed integrally with the base, a vertically disposed upright standard in the boss on the base, a valved gas supply pipe connected to the standard, and a burner supported on the upper end of the standard and connected to it. The burner includes several horizontally disposed concentric hollow annular rings connected by several equidistantly spaced pipes arranged between the rings on substantially the same horizontal plane. The rings have annular top ribs with shoulders at the inner and outer sides. These ribs have several spaced apertures for passage of gas jets, and spaced concentric open ended sleeves supported at their lower ends on the shoulders at opposite sides of the ribs and apertures for impingement of the jet flames. The sleeves have closely spaced openings, the open upper end of the innermost sleeve providing unobstructed passage of air through the end. The innermost sleeve stops short of the upper end of the adjacent sleeve, causing the draft through the center to mix with and deflect the gases rising between the inner sleeves toward the outer sleeve.

—Joseph Manteria. Springfield, Mass. Patent 2,621,721

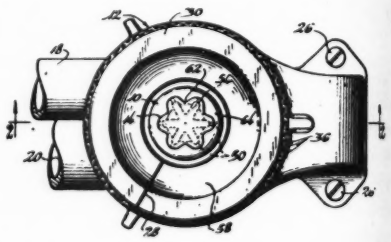
Combination oil and gas burner



A vaporizing type oil burner, this device has an annular radiant, a mixing nozzle, and means for supporting the radiant and mixing nozzle in an aligned, axially spaced relationship. The annular gas burner between the radiant and the mixing nozzle is arranged to produce a high temperature zone. A vaporizing pan suspended in this zone has a thermally conductive booster to conduct additional heat into the fuel supplied to the pan. It also has means for supplying a limited flow of fuel oil to the pan, where the fuel oil is continuously vaporized, and means to supply a flow of combustion-supporting air in the locale of the high temperature zone to burn the vapor emanating from the pan.

—Cyril Charles Young, Kansas City, Mo. Patent 2,621,716.

Gas fueled simmer burner with flame retaining ports



This gas burner consists of a chamber with a central recess, several radially extending cavities of equal width, and a narrow peripheral slot extending around the burner and intersecting with the outer ends of the cavities, thereby forming gas escapement ports opening outwardly and sideways from the outer ends of the cavities. The structure also has other angularly spaced ports opening into the chamber, of greater diameter than the height of the slot, and in ignition relation to it.

—Phillip S. Harper and Vincent C. Peterson, Chicago. Patent 2,619,164.

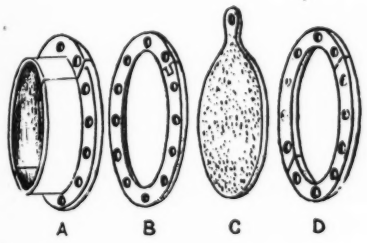
A safe way to make cut-outs on large low pressure mains

By H. T. LIBBY • British Columbia Electric Co. Ltd., Vancouver

WE recently had to divert several 16- and 20-in. low pressure mains in order to make way for the footings to the approaches to the new Granville street bridge in Vancouver. On the first diversion we used the conventional bag and stopper technique but the main was so dirty that even after repeated attempts to clean it we were only partially successful in stopping off the gas. The men had to use gas masks for all work in the ditch and the other men around the job got enough gas to give them bad headaches.

The following plan was worked out and was successfully used on the rest of the diversions. It was found to be easy to apply and it sealed off the gas so well that, after purging, the lines were cut and welded with acetylene and electric. Except for a few minutes at the start and finish, gas masks were neither required nor used. We used the idea on 16- and 20-in. mains, but there is no limitation to the size on which the idea can be applied.

The same system can be used to advantage any time that a line is being capped off that is planned to be extended at some future date. If a pair of companion flanges and a frying pan are used to finish off the line the extension can be completed, tested and be all ready for service before any gas is introduced. It can then be put into service simply by pulling the frying pan.

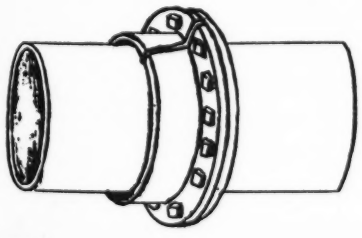


Step 1.

Make up a pair of flanges for the pipe (*parts A* and *D* in the diagram above). These flanges can be designed to weld on to the pipe or can be equipped with bell ends for calking. Cut these flanges radially so that they each fall into two halves. Chamfer the edges ready for rewelding.

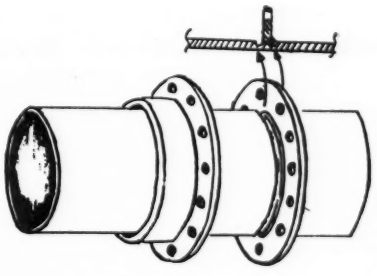
Part B is the gasket. It is cut in one place with a dovetail joint so that it can be put over the pipe. If the gas is coming both ways, two gaskets to each pair of flanges are desirable.

Part C is a blanking plate made of 10 gauge iron sized to fit just inside the bolt circle and with a handle left on it. We refer to this part as the frying pan.



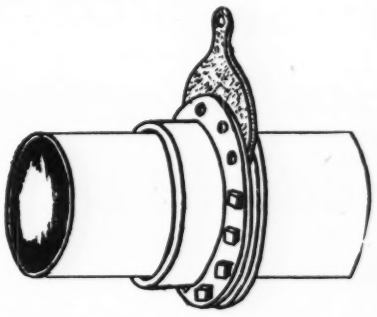
Step 2.

Assemble the two flanges on the pipe with the cuts at right angles to each other so that each flange acts as a splint for the other. Make the welds necessary to restore the flanges to their original form. Line flange *D* up with the pipe and weld it to the pipe in the normal way. If you have planned on calking both flanges in place, simply calk instead of weld.



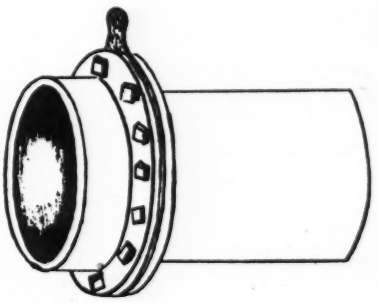
Step 3.

Unbolt the flanges and slide the loose one down the pipe out of the way. Use a cape chisel in a pneumatic chipping gun and groove the pipe as deeply as you dare without actually parting the pipe. If you do break through, plug the leak with red lead putty or whatever you like. Make the groove about ⅜ in. wide. This can be done well in advance of the cut-out. When you are ready to cut out, part the pipe with the use of a parting chisel in the air gun. A special chisel should be used that gives a cut at least ¼ in. wide. Follow the chisel with wet rags calked into the cut. The men doing this part require gas masks. When the pipe is entirely parted, cement the gaskets to the flanges, using Permatex or similar gasket cement.



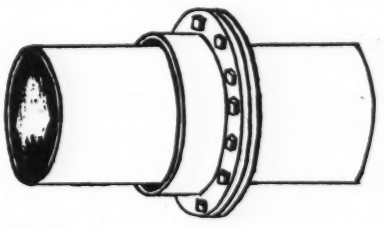
Step 4.

Remove the rags, look through the cut to make sure that it is clear, grease the frying pan and insert it. The grease makes it easier to insert and remove, and prevents the gasket sticking to it. Bring up the companion flange and bolt tight. If a diversion is being made, two such installations will be required, one on each end of the diversion.



Step 5.

Purge the pipe between the frying pans and proceed with the cut out. No gas will be present and oxyacetylene cutting may be used.



Step 6.

Insert the new pipe into the flange. Make the joint by calking or welding. Remove one frying pan and purge. Remove second frying pan. Tighten bolts and test. Gas mask is necessary while removing frying pans, but inasmuch as the frying pan is inside the bolt circle, only the top half bolts will need removing. Tighten up the flanges and test.

Presented at the PCGA techincal services conference in Los Angeles in February. The paper was delivered by J. R. Grey, technical assistant.

Gas advertising character adopted by 18 utilities

By W. H. ROHR JR. • Handy Flame, Indianapolis

Copyright 1946, by W. H. Rohr Jr.

This is a progress report on "Handy Flame," the cartoon character that GAS helped to introduce six years ago (April 1947). But more than that, it's a report on progress made by the industry to adopt an integrated character on a nation-wide basis—a character that will do the same job of product identification for the gas industry that Reddy Kilowatt has done for the electric industry.

Whether the choice be Handy Flame or any of a number of other cartoon personalities now available, the adoption of a single character for the entire industry, on a nationwide basis, is still a worthwhile objective.

WHEN I first introduced the copyrighted gas advertising character, Handy Flame, back in 1947, I hoped it would be adopted by 25 companies within six months. Instead, it took six years. During the first year, the character was hired by two utilities, North Shore Gas Co., Waukegan, Ill., and Central Indiana Gas Co., Muncie, Ind.

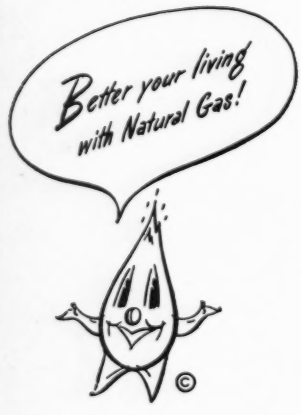
Today, Handy is helping sell gas service in 13 states. He's on the sales force of 18 gas utilities, including the original two, seven L. P. gas companies, and one gas association.

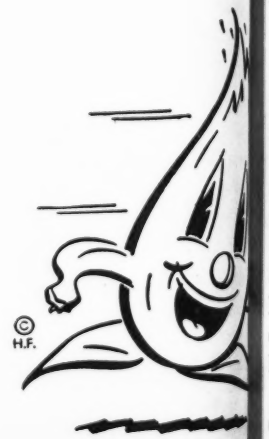
Utilities subscribing to the Handy Flame service range in size from Pendleton Natural Gas Co., which serves less than 1000 customers, to Equitable Gas Co., with more than 200,000 customers. To create a friendly atmosphere in their advertising, these companies use the figure as a happy salesman to promote gas service on toy balloons and bowling shirts, on delinquent notices and in animated TV commercials, and in practically every form of utility advertising.

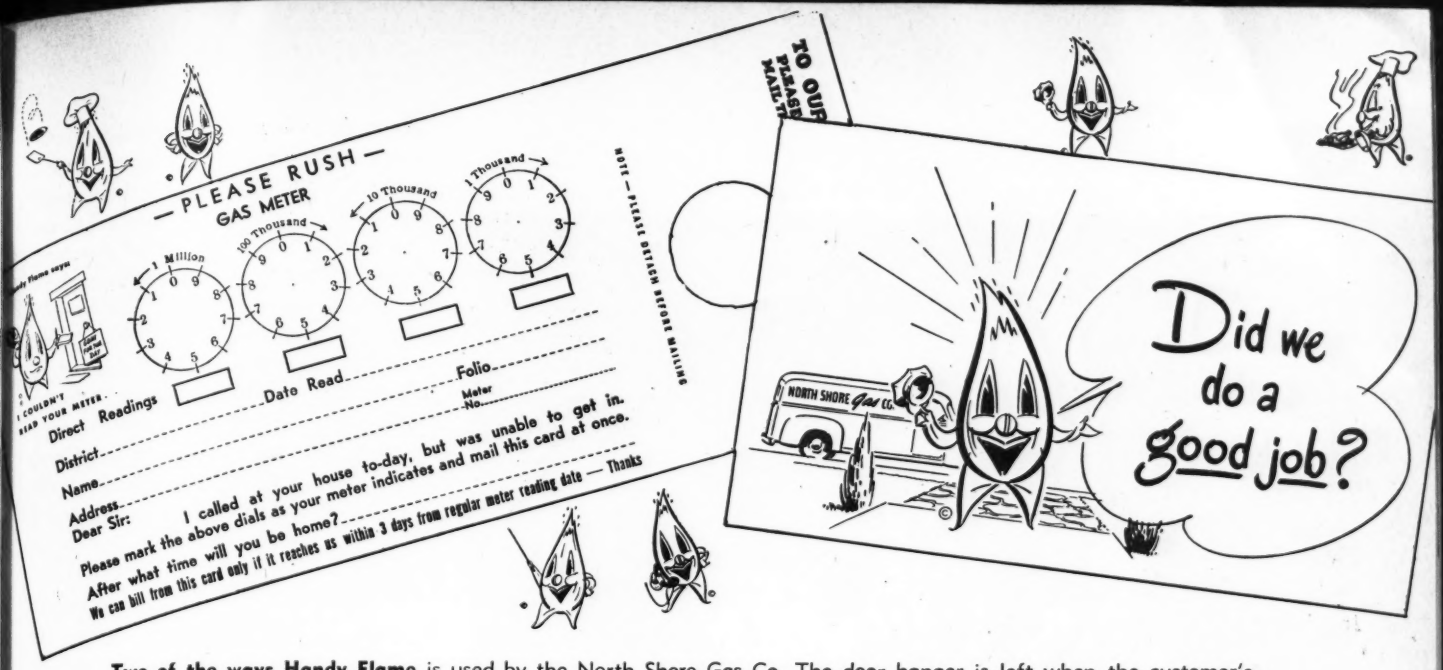
Handy is used most frequently in newspaper advertisements where he has been featured in space up to a full page. Yet he is at his best in small ads. Here are two examples:

For the Seaboard Gas Co., Handy appears in a different pose each day on the comic page of a Charleston, S. C., paper. Space is only 3 in. of one column. Copy is usually a jingle about the company's gas service, only three or four lines plus signature and telephone number.

Another effective one-column ad program is run regularly by North Shore Gas Co. Each ad is an editorial style column with the standard heading "Cookin' with Gas," and shows Handy delivering a sizzling steak. There are only a few short paragraphs, a cooking hint, comment on a current news item, and mention of some appliance. Since the heading and signature remain the






— PLEASE RUSH —
GAS METER
1 Million
100 Thousand
10 Thousand
1 Thousand
I COULDN'T READ YOUR METER
Direct Readings
Date Read
Folio
District
Name
Address
Meter No.
Dear Sir:
I called at your house to-day, but was unable to get in.
Please mark the above dials as your meter indicates and mail this card at once.
After what time will you be home?
We can bill from this card only if it reaches us within 3 days from regular meter reading date — Thanks
NOTE — PLEASE DETACH BEFORE MAILING
NORTH SHORE Gas Co.
Did we do a good job?

Two of the ways Handy Flame is used by the North Shore Gas Co. The door hanger is left when the customer's meter cannot be read and the card at right is sent to the customer after an appliance installation.

same, new ads require only resetting of copy.

An excellent job of customer relations is being done through direct mail by one of our small utility subscribers, Frederick (Md.) Gas Co. This company keeps its customers posted on sales and service news with an informal one-page mimeographed bulletin that carries the illustrated title, "Handy Flame says." Problems that many utilities keep to themselves are freely discussed. Customers are told how they can help and their cooperation is encouraged. Other topics may include a simple explanation of the differences in gas and electric refrigeration or a factual report on gas water heaters. There are no exaggerated claims and no superlatives, just sound common sense that builds good will, confidence, and sales.

Sales messages on customer bills are a definite part of Central Indiana Gas Co.'s promotion program. Here, Handy Flame presents a different message each month to tie in with the current AGA campaign.

For years, employees at North Shore Gas have been known as "the friendly people." As an example of the ways the company lives up to that reputation, following an appliance installation, the customer receives a card on which Handy tips his hat and asks, "Did we do a good job?" (See above.) The card carries a business reply section with space for the answer.

Delinquent accounts always present a delicate problem in customer relations. North Shore turns this problem into an opportunity with the help of Handy Flame. The first notice shows Handy tipping his hat again as he reminds the customer, "Say, boss, you forgot my pay." If this notice is overlooked, a second one goes out. This shows Handy with tears in his eyes as he says, "There's only 5 more days."

A third example of North Shore's friendly business tactics is a door hanger that is left when the customer's meter cannot be read (above). On the card Handy asks the customer to make his own reading, mark the meter dials illustrated on the card, and mail it. Result: a substantial increase in meters read.

A number of utilities draw the line when it comes to using a character on their letterhead, but not Ohio Valley Gas Co., a small but aggressive Indiana utility. With Handy on its letterhead, the company has added friendliness while still retaining good taste.

Equitable Gas Co. probably uses the figure more often and in more different ways than any other subscriber. In addition to newspaper, direct mail, radio and TV advertising, the company has put Handy to work on decals, book matches, dealer promotion calendars, the employee magazine, inter-office memos, place mats, and employee bulletins. The character has even been cast in aluminum and greets customers from a perch on the front of office buildings next to the company name. Inside each office, a 12-in. statuette of Handy offers customers free recipes. Yes, he appears on the recipes, too. By using the character in every campaign and in every advertising media, Equitable has given a strong continuity and follow-through to its entire program.

Each Handy Flame subscriber is free to originate its own uses for the figure and to adapt those developed by other companies. It works like this: Princeton Gas Service Co. worked out a postmark ad; the Key City Gas Co. adapted the idea for use in its territory. Terre Haute Gas Corp. liked the installation follow-up card originated by North Shore Gas Co. and now uses it. One small utility developed a die-cut price tag in the shape of Handy Flame. Today, just about every other subscriber is using it.

Two subscribers, Newport Gas Light Co. and Wisconsin Southern Gas Co., employ advertising agencies. With a ready-made Handy Flame art and idea file at their disposal, the agencies are able to save production costs and creative time for their clients.

The Handy Flame staff serves as a clearing house for new ideas and applications. Its main function is to help each company obtain maximum value from use of the character. One of our big jobs is to develop Handy Flame poses suitable for illustrating every conceivable sales point. These poses are made available in the form of proof sheets, newspaper mats, reproduction photostats, and electrotypes.

For the Handy Flame service, which includes exclusive use of the copyrighted character in their area, subscribers pay an annual fee based on the number of customers served, size, and population of the area. Utilities pay one-half cent per customer per year, while LPG dealers pay on the basis of population and number of counties served. Minimum annual fee is $25.

Recently, Handy has been growing up fast, being adopted by an average of one new company each month.

GAS exclusive

A typical Junior Achievement group sponsored by Philadelphia Gas Works. High school students in this group go through all the operations of running a full-scale bakery. They are shown here in the middle of a mixing operation, being advised by a member of P.G.W.'s staff.

Philadelphia Gas sponsors Junior Achievement program

By **FRANK H. TREMBLY JR.** • Philadelphia Gas Works

MORE than 1500 corporations in the United States will go out of business this month! They are currently closing their books, liquidating their inventories and laying off their help. They are going out of business completely.

An occasion for sorrow? Not in the least. The help is happy. Their families are happy. The stockholders are happy. Gas companies and their employees who have devoted a great deal of time and thought to these businesses are happy, too.

Because these are Junior Achievement companies, organized and operated by thousands of teen-agers who learn about business by running a business as part of the unique Junior Achievement program of economic education.

The employees in these companies are the teen-agers themselves who double in brass as the management of the miniature corporations that they have organized and operated for nine months.

They started last fall when, in groups of 12 to 15, they began their practical experience in business by starting one of their own. They chose a product or service to produce and sell and elected their own officers (all of the youthful members of the company are members of the board of directors).

Next step was to finance their company so they could start their operations. They sold stock at 50 cents a share until they raised their working capital, which averages about $100. With this capital they bought raw materials and rolled up their sleeves, for they were all members of the working forces as well as members of the board of directors. They held board meetings once a month to decide on the wages they would pay themselves and to solve the many knotty problems that arose: salesmen's incentives, need for more efficient production, improved distribution, and the other policy decisions that must be made by any board whether it be made up of mature or youthful enterprisers.

They are deliberately going out of business. If they have made a profit, and most of them have, they will return to each stockholder his original investment plus a liquidating dividend. And if, as is sometimes the case, a J.A. company has not made money, the youthful board has another task to perform, explaining why to stockholders. That's learning by experience too.

So the achievers, the teen-aged members of Junior Achievement, now have practical business experience that will stand them in good stead later on.

Their advisers, adult volunteers from local businesses who have met with them one night a week for two hours, have also learned. They have been helping to guide the small-scale corporation and so have had to consider company operation from an over-all point of view they rarely get in the course of their regular work.

And the sponsors, among whom are many leading gas utility companies, also are beneficiaries of the operation of the J.A. companies. For in providing three advisers for a junior company they are adding another "plus" to their own community relations program. And just as important, they are benefiting from the increased understanding of our economic system that the achievers have gained from their personal experience in such business problems as meeting a payroll, paying taxes, increasing productivity and boosting sales.

The Philadelphia Gas Works has been actively participating in the Junior Achievement program since its inception in Philadelphia in 1948. Each year, P. G. W. sponsors a type of juvenile business operation involving maximum use of gas ranges and gas refrigerators. Usually, the product is in the form of baked goods such as cookies that can be produced in substantial volume and sold at reasonable profit.

A typical operation of this nature sponsored by P. G. W. is the "JABCO" (Junior Achievement Baking Company) group. High school students comprising this group were instructed in how to conduct all phases of the business, including production, merchandising, sales, and accounting activities normally encountered in a full-scale bakery.

Culinary experts from P. G. W.'s home service division helped in the initial meetings. They provided basic cookie recipes that could be improved on as the youngsters progressed. Sugar cookies proved a good starter, leading to such variations as chocolate, raisin, peanut butter, etc.

Weekly meetings were held in a modern "workshop" equipped with a battery of gas ranges and gas refrigerators at Junior Achievement headquarters. Later, in order to give the achievers more extensive facilities for their work, the base of operations was changed to P. G. W.'s district office.

An evening's work began at 7 and ended at 9 o'clock. In that period, business meetings were held, production problems discussed, orders taken for the evening's output, revenue collected from the preceding week's sales, and books brought up to date.

While these activities were under way, a work crew was preparing the cookie mix, keeping the gas-heated ovens filled with trays of cookies, and planning how to package them at the close of the session.

The cookie yield varied from 50 to 130 dozen a night, depending on the diligence and attendance of the youngsters. They were sold at a predetermined scale of prices, and now at the end of a fiscal year's business, the youngsters are liquidating their stock and sharing in profits earned through their original investments.

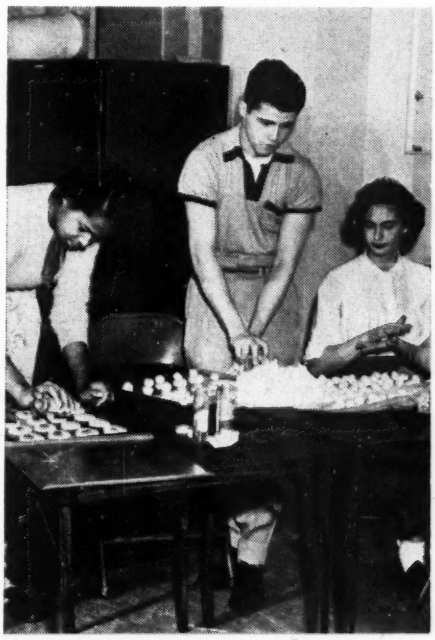
Numerous Junior Achievement citations and awards of merit have been presented to P. G. W. for its cooperation in the program. The company is represented on the J.A. board of directors, and personnel from its supervisory forces are loaned to J.A. to act as advisers for the boys and girls.

P. G. W. is one of many utilities throughout the nation sponsoring similar operations in the J.A. program. Others are: Blackstone Valley Gas & Electric Co., Consolidated Edison of New York, Cincinnati Gas & Electric Co., Michigan Consolidated Gas Co., New Bedford Gas & Edison Light Co., Northern States Power Co., Ohio Fuel Gas Co., Peoples Gas Light & Coke Co., Peoples Natural Gas Co., Philadelphia Electric Co., Philadelphia Gas Works Co., Public Service Co. of Illinois, Public Service Electric & Gas Co., and San Diego Gas & Electric Co.

The same positive public relations values that work for us at P. G. W. are hard at work, I am sure, for other utilities in the Junior Achievement program. The achievers are identifying themselves personally with their sponsoring company. The sponsor is no longer a group of buildings, it becomes to these teenagers a group of people, exemplified by the three advisers who have been taking a warm and active interest in their welfare and in the operation of their small company.

The youngsters have had an opportunity to meet and talk with executives of the sponsoring firm and to learn that the latter are not aloof brass hats, but are instead warm and interested human beings. The more the youthful business executives meet with their adult counterparts, the more they make this personal identification. They begin to see the problems of the sponsor because they have met some of these same problems when running their own business. And they are, perhaps, deciding that they could do a lot worse than to work for their sponsor when they are ready to enter the business world.

The community relations potential does not stop at the achievers level. It goes further and takes in the youngsters' parents as well as the scores of stockholders in the miniature company.



Another section puts the finishing touches to some fancy cookies.

Most important, of course, is the fact that Junior Achievement is good public relations for every gas utility because it is developing a wider understanding of the bed-rock facts of our economic existence. The teen-aged members of Junior Achievement companies have learned about business by running one of their own. What they have learned has not come from books or pamphlets or from hearsay, it has come from experience.

They have learned of the need for capital because they have raised it for their own company. They have learned that there is a risk in investment and that the risk-takers deserve a profit because they have owned stock and have sweated out their investment. They have learned that productivity and sales and jobs go hand in hand because they have seen that poor products do not sell and that slumping sales mean dwindling income. They have learned, in short, that success requires initiative and work because they have seen how these qualities can make the difference between a profit and a loss on their company ledger.

Although Junior Achievement began in Springfield, Mass., in 1919, it has been operating on a national scale only since 1945. In 1945, it was operating in 14 industrial areas in a dozen states. Since then it has grown so that the benefits of the J.A. program are now felt in 61 communities from Boston to San Francisco and from Minneapolis to Houston.

Junior Achievement is led and supported by American business. It has grown considerably and should grow even more. The businessmen who lead J.A. will welcome the support of every American business firm. There are three ways business leaders can help:

First: By sponsoring J.A. companies, as many as possible, and making sure that the little corporations get the best possible advisers.

Second: By helping with the financial support of the program. Expanding the program requires additional manpower and expenditures before a new community can start a program of its own.

And finally: By selling Junior Achievement to fellow business leaders. You can talk to friends about it. You can take the lead in starting a program in your own community. Or, if you are already active, you can bring still more businessmen into the program. Help and information can be obtained from Junior Achievement Inc., 345 Madison Ave., New York 17, N. Y.

"SALES CLINCHERS" FOR GAS RANGE SALESMEN
No. 1 of a Series

to sell her the *GAS* range
show her the *"FUEL-MISER"*

ALLTROL®
Center Simmer

It's a proved fact: show your customers the extra benefits . . . the *advantages* of the Alltrol Center Simmer surface burner, and you'll make the sale! No other fuel, no other type of range* gives the economy, the cool, quick cooking, the flavor-saving features that are possible with Alltrol Center Simmer surface burners.

ONLY ALLTROL BURNERS HAVE A *COMPLETE* HEAT CYCLE

Full flame Starting Burner for quick boil or fast frying.

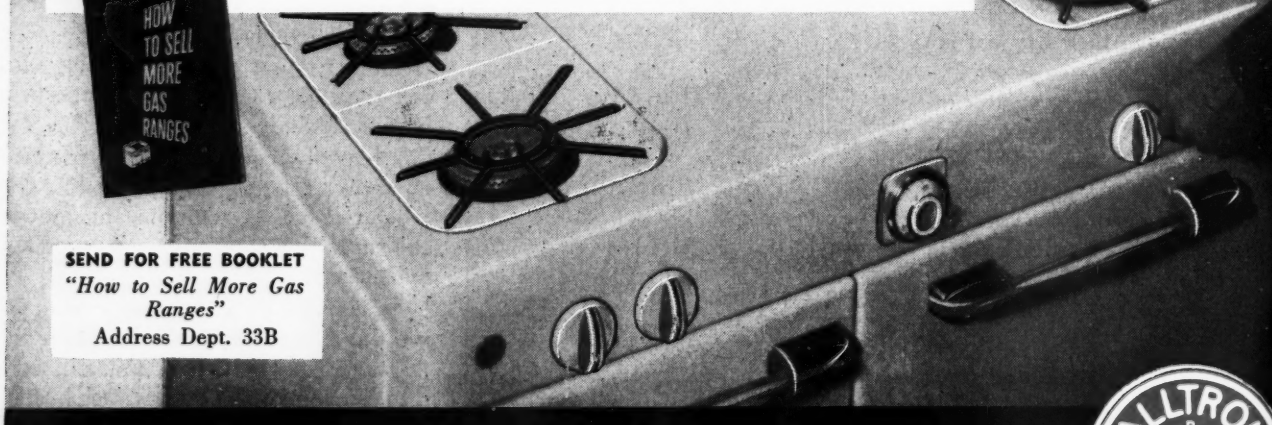
A full range of intermediate heats when wide spread of heat is needed.

Click . . . here's efficient "Center Simmer" that maintains boiling in any covered vessel.

Click . . . a gentle "Keep Warm" heat . . . without further cooking.

**Write for names of ranges featuring ALLTROL Center Simmer Burners.*

SEND FOR FREE BOOKLET
"How to Sell More Gas Ranges"
Address Dept. 33B



HARPER-WYMAN COMPANY

8562 Vincennes Avenue — Chicago 20, Illinois

"ALLTROL CENTER SIMMER" MAKES GAS THE WINNER!

ALLTROL® CENTER SIMMER

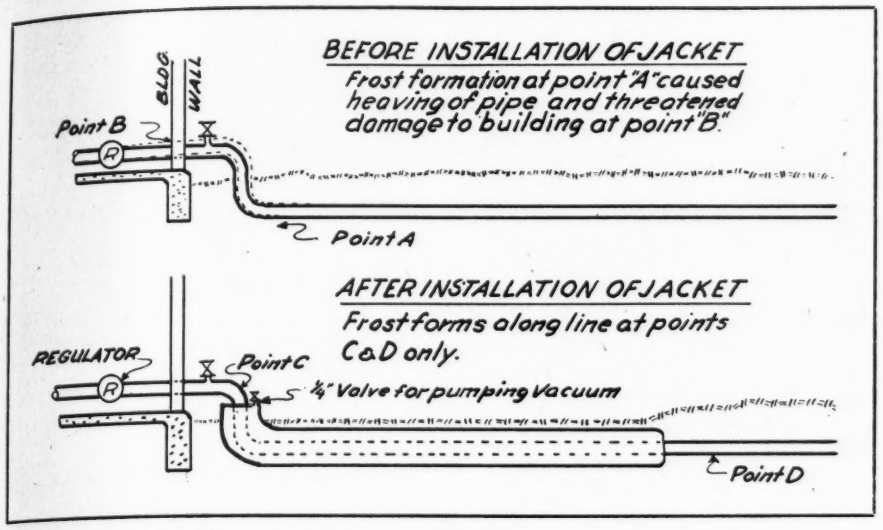

BEFORE INSTALLATION OF JACKET
Frost formation at point "A" caused heaving of pipe and threatened damage to building at point "B."
BLDG WALL
Point B
Point A
AFTER INSTALLATION OF JACKET
Frost forms along line at points C & D only.
REGULATOR
Point C
¼" Valve for pumping Vacuum
Point D

Fig. 1. Diagram of vacuum jacket installation showing operating conditions before and after installation.

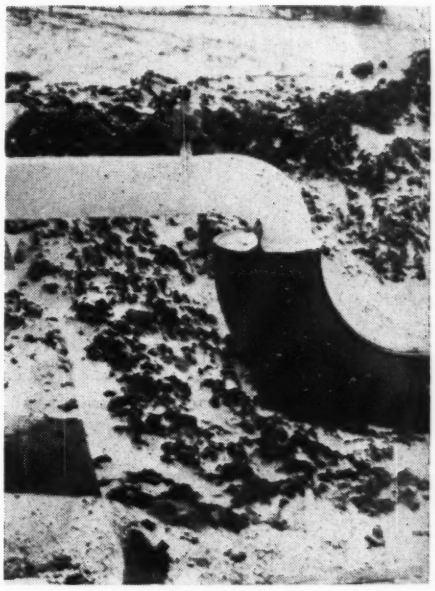


Fig. 2. Ice forms on the 6-in. pipe at the inlet to the vacuum jacket while the jacket remains frost free.

Vacuum jacket around pipe prevents frost heaving

By **C. E. WILLIAMS** • United Natural Gas Co., Oil City, Pa.

MANY gas men have been confronted with the danger and damage resulting from heaving of lines and fittings as a result of frost formation on the outside of gas piping downstream from large pressure "cuts." Such frost formation and heaving is particularly damaging to brick or tile walls and foundations where piping passes through the walls and into the ground outside of the building downstream from the pressure regulators.

In an effort to overcome one of these frosting and heaving conditions, which threatened damage to the wall of a tile regulator building during the winter of 1951-52, United Natural Gas Co., Oil City, Pa., welded about 30 ft of 16-in. pipe around the 6-in. pipe carrying gas downstream from the regulators so that it was gas tight and pumped a few inches of vacuum on the annular space. This created a thermos effect at the point where the pipe entered the ground and thus prevented frost formation and consequent heaving of the pipe in the proximity of the regulator building. Gas pressure at this location was reduced from approximately 550 psig to 110 psig.

Fig. 1 is a diagrammatic sketch showing operating conditions before and after installation. *Fig. 2* shows the ice formation on the 6-in. pipe at the inlet to the 16-in. vacuum jacket and the absence of frost on the 16-in. itself. *Fig. 3* shows the frost formation at the outlet of the vacuum jacket and the heaving of the ground across a field, which heaving extended for approximately 1000 ft in the downstream direction. *Fig. 4* shows the exposed portion of the vacuum jacket after the ground had been replaced and illustrates the protection to the building wall by elimination of the heaving action nearby. Frost on the pipe where it passes through the wall of the building is removed occasionally by applying a little methanol from a "squirt" can on the ice at this point. Results of this experiment were entirely satisfactory.

This same principle was used at a road crossing where frost action on the outside of a gas line had caused heaving and breaking of the concrete surface of a paved highway. In this case, however, it was not necessary to pump a vacuum on the annular space between the gas line and the conduit pipe since the dead air space, vented at each end of the conduit was sufficient to protect the roadway.

The principle is not new but the application appears to be a simple remedy to a problem that has plagued the gas operator for a long time.

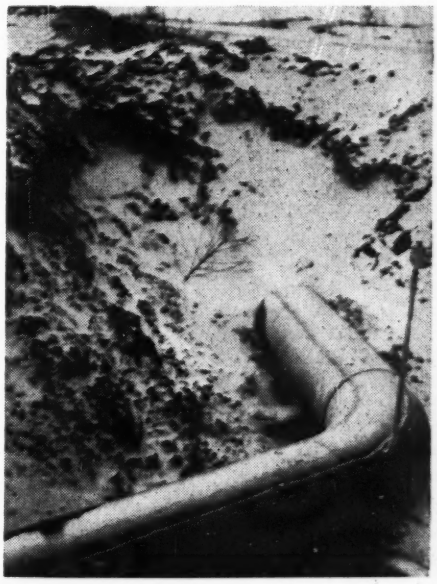
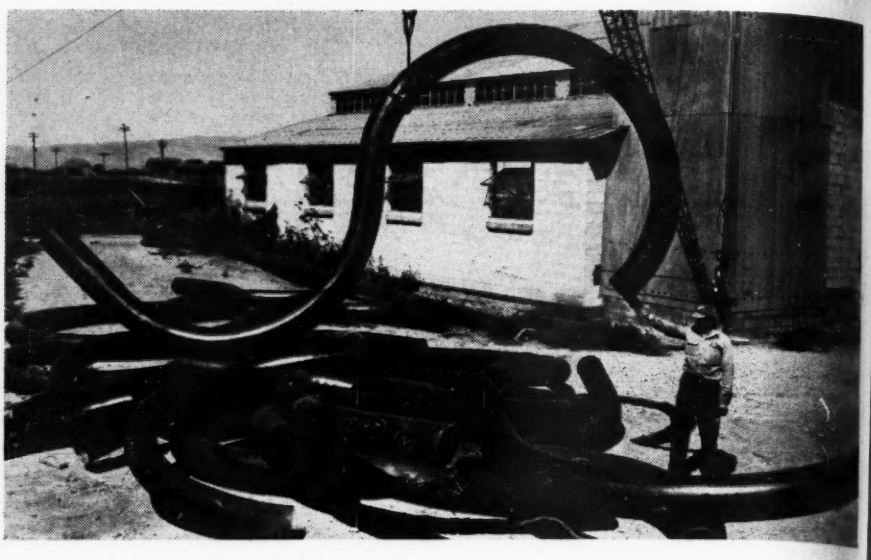


Fig. 3. Frost formation at the outlet of the vacuum jacket. Heaving of the ground can be seen clearly in the background.

Fig. 4. The exposed portion of the vacuum jacket after the ground has been replaced, showing how building is protected by elimination of heaving action nearby.

GAS exclusive



Bending pipe of this size without collapsing it is the specialty of the Hjorth Brothers prefabrication plant in Utah. Shown here is a section of 12-in. loop line that was bent for use on a Geneva Steel Co. project.

Bending large pipe without collapse

This 14-in. steam expansion loop was also bent for Geneva Steel Co. for use on its steam line. The Hjorth company is the only one of its kind in the Intermountain area.

ABOUT 50 miles south of Salt Lake City, in the little farming community of Mapleton, Utah, two brothers have established the unique business of bending pipe up to 14 in. without collapsing it.

Although the process is relatively simple, these two brothers, Hugh and Carlos Hjorth, are the only ones in the Intermountain area who can do this work, and already their venture has become a good-sized operation, important to oil refineries, steel plants, pipeline companies and other businesses in Utah, Idaho, Wyoming, and Colorado.

The process of bending large pipe without collapsing it starts with the welding of a metal plate to one end. The pipe is then placed on end in a sand bin, a hopper is filled with silica sand and hoisted to the top of the huge pit, and the pipe is filled to capacity. A pneumatic vibrator packs the dry sand in solidly. The pipe is then moved to a brick oven, measuring approximately 3 ft by 20 ft, and heated until it is red hot. This furnace, which the brothers built themselves, has three heats. It now uses oil but they are hoping that before long gas will be available for their work.

When the pipe is sufficiently hot, an overhead crane lifts it over to the bending block, which is composed of mandrel forms in various angles. These allow the pipe to be bent to the desired radius, a normal bend being five diameters of the pipe. The pipe is clamped down to the bending floor with a backing block—a slotted block on a slotted floor and T-bolts are used to prevent it from slipping while it is bent around the mandrel form. A 100-ton cable winch is used to do this. Snatch blocks with big hooks hold the pipe to the form. While the bending process is proceeding, additional heat is applied by burners using fuel oil and compressed air, throwing a blue flame 6 in. in diameter. This intense heat is applied to any spots that have not heated evenly during the oven treatment. It takes 12 hours to cool a bend so water is used constantly on the bending floor to keep it from buckling under the heat.

The brothers have had some interesting work in the short time they have been in business (only since the war). For example, they played a major role in making possible the on-time completion of the Pioneer pipeline from Sinclair, Wyo., to Salt Lake City. When a delay of several months faced the oil company because it could not obtain pipe fabricated and bent to specifications, the Hjorth brothers took over the job and the 300-mile products line went into operation at the year's end. To do this, they had to make bends for the valve boxes of approximately 40 stations on the line.

The Hjorth brothers also bent 2300 ft of pipe in a watchspring coil for the bottoms of six tanks for the Salt Lake Refining Co. This was done to keep the oil in the tanks warm, to aid free flowing. They made the bends in sections, in different radii, numbering each one. There were 17 of these, ranging from 2 ft to 38 ft in diameter, for each tank bottom.

Most pipe to be bent comes in 18- to 25-ft lengths, but this company has bent 14-in. pipe measuring as long as 26 ft

An expanded line ...expanded merchandising

Now! Year 'round profits for dealers . . . based on a full line of home comfort equipment backed by 30 years' experience. There's no better known name in the industry than Eureka Williams—no better heating equipment than OIL-O-MATIC and GAS-O-MATIC, no finer residential cooling unit than Williams-engineered AIR-O-MATIC. For 12-months-a-year profit facts, write TODAY!

WILLIAMS DIVISION
Eureka Williams Corporation
Bloomington, Illinois

...expanded profits for YOU!

EUREKA WILLIAMS
OIL·O·MATIC
Automatic Home Heating

EUREKA WILLIAMS
GAS·O·MATIC
Automatic Home Heating

EUREKA WILLIAMS
AIR·O·MATIC
Automatic Home Cooling

GAS staff report

Gas is again the tax target as Texas legislature convenes

NATURAL gas is playing a major role in the 53rd Texas legislature, but it's a role the gas industry didn't seek for its product.

Texas lawmakers again have put the finger on the popular fuel to provide additional revenues for the Lone Star state.

Only a few days after the legislature convened in January, a natural gas tax bill, given the position of House Bill Number 2, was introduced. Since then, two other major bills have been introduced, both designed to make the gas industry "pay the freight."

The University of Texas bureau of business research recently reported that oil and gas operators already pay nearly two-thirds of the state tax bill, while Texas has many other natural resources that are relatively untaxed.

Gas companies likely will get no sympathy from Gov. Allan Shivers, who, in his initial message to the legislature, suggested that if the state expanded its spending program, it might levy an increased tax on the natural gas "long lines" that carry natural gas into other states. He has partially embraced one of the current gas tax bills and has encouraged the natural gas gathering tax bill, passed by the last session of the legislature in 1951. That bill, which imposed a gathering tax on natural gas of nine-twentieths of a cent per Mcf, was declared unconstitutional in 1952 by an Austin district court, but on Feb. 3 of this year it won the approval of the Third Court of Civil Appeals at Austin.

Governor Shivers said in 1951 if the natural gas pipeline operators went to court to attack the gathering tax, they might face a stiffer levy at the legislature's next session. That warning apparently has materialized. The initial gas tax bill introduced in this legislature is four times rougher than the 1951 gathering tax bill.

It is a natural gas "compressor" tax bill, introduced by Rep. Dolph Briscoe of Uvalde, a wealthy cattleman, to bring in what he estimated would be $6 million a year revenue.

When Mr. Briscoe introduced the bill in January, he said it would overcome legal defects of the 1951 gathering tax bill. The higher court's approval of the gathering tax in February didn't discourage Mr. Briscoe. He said, "this really does not affect our financial picture unless the gas companies accept this decision as final."

Gas companies, however, already have indicated they will appeal the civil appeals court's decision all the way to the U. S. Supreme Court if necessary. Losers in the appellate court were Panhandle Eastern, Michigan-Wisconsin and Amarillo Oil Co. Many other companies have been paying the tax under protest, and more than $11.5 million is now "frozen" in the state treasury.

Mr. Briscoe pointed out his bill would provide funds for an expanded state highway construction program, an increase in teacher salaries, an improvement of the water conservation program, and assistance to cities for street improvements.

Gas industry spokesmen have asked themselves why they should have to pay for projects which are irrelevant to the gas industry and strong objections probably will be raised as to the fairness of the bill. Some pipelines extend from the Rio Grande Valley across Texas before going to markets in other states. By contrast, one major exporter of Texas Panhandle gas reaches only a quarter of a mile inside the state to pick up supply. One large gas company system, largely within Texas, estimates the tax would cost its industrial customers alone $5 million a year.

Another gas tax bill introduced this year is a "processing" tax plan, which would supplant the gathering tax if it is declared unconstitutional or supplement the gathering tax if it is finally upheld. Its author, Rep. Charles E. Hughes of Sherman, wants a full one cent per Mcf tax on natural gas, which he estimates would raise nearly $30 million a year.

Rep. Hughes defines processing as "any mechanical or chemical means by which oil, gasoline, hydrocarbons, water, sulfur or extraneous matter are separated or removed from gas." He predicted this would apply to 95% of all pipeline gas.

A third bill, sponsored by Rep. George T. Hinson of Mineola, would collect two cents a thousand on gas produced under contracts covering more than a single year. He is aiming at the "dedication" agreements by which pipeline companies and others tie up reserves.

Like Mr. Briscoe, sponsors of these bills have said the validation of the gathering tax by the appellate court will not affect their efforts to get their bills adopted.

A Senate bill of this legislature is an old plan to empower the state to fix prices on natural gas statewide. Its author is Sen. Wardlow Lane of Center. The measure would permit the Texas Railroad Commission to set specific minimum prices to be paid at the wellhead for gas produced in the state, where necessary to prevent waste or conditions conducive to waste.

Theoretically double barreled in effect, its proponents contend it would increase state revenue from natural gas through the state's percentage-tax on the selling price and conserve the natural resource at the same time. It also would benefit royalty owners tied to low prices in old contracts with gas companies and pipelines.

Gas company representatives say that under this price fixing bill, the railroad commission would become subject to the powerful pressure of well organized producers and royalty owners. They pointed out that of the total $146 million increase in gas rates under this bill, 36 gas producers would receive in excess of $87 million.

"Public welfare and public interest are not served when 36 producers are able to penalize thousands of industrial and residential consumers by making them pay the bill," one gas company official said.

If the legislature can fix a minimum price for natural gas under the guise of preventing economic waste, why can it not do the same thing for oil, for potatoes, for livestock, and for cotton, opponents of the legislation ask.

Fig. 1. The improved Pearson holiday detector transmitter designed by SoCal engineers.

SoCal engineers improve Pearson holiday detector

By A. LETO and S. K. GALLY

Southern California Gas Co., Los Angeles

EARLY model transmitters and receivers used with the Pearson pipe coating holiday detector left much to be desired as respects both performance and portability, and it was these inadequacies in operation that prompted engineers to design new units to take their place. With these newer models (shown in *Figs. 1* and *2*), operation of the detectors is greatly improved.

The early transmitters, because of their low current output, did not permit an adequate length of pipeline to be walked from one transmitter location. With the improvements, the operator can now search for holidays five or six miles from the transmitter.

The early receiver was awkward to carry and heavy, and had disturbing microphonics. The new one weighs but 1.1 lb and is freer from interference.

The Pearson pipe coating holiday detector was developed by the late Dr. J. M. Pearson for accurately locating holidays in the coating of a buried pipeline. A transmitter causes an alternating electric current of audible frequency to flow between the pipeline and another buried object or ground. Two men wearing spiked shoes wired to a portable amplifier called the receiver, walk over the pipeline about 20 ft apart. The holidays are detected by a marked increase in the volume of the tone in the headphones of the men carrying the amplifier when either man is over the holiday. When a coil of many turns of wire is attached to the receiver input, it may be used for locating or tracing the pipeline.

Basically, the Pearson transmitter is a 1000-cycle generator. It consists of two main parts—a vibrator and an amplifier. The vibrator provides the primary source of 1000-cycle current. The unit used is a General Radio precision buzzer-type vibrator. It was selected because some receivers require an accurate signal frequency since they are equipped with acceptance-type 1000-cycle filters to exclude other frequencies such as interference from power lines. The vibrator operates from either a 6-volt dry cell contained in the case or from an external storage battery.

While the output of the vibrator alone may serve as the signal current, it is very low (15 milliwatts). Some loads, such as shorted pipelines, overload the vibrator so it does not function. A single stage current amplifier was therefore added to boost the output. The output of the vibrator is fed through a coupling transformer to an amplifier that uses a 6AQ5 tube in a conventional circuit. The output of the amplifier is varied by means of a gain control and fed to the load through a load-matching transformer. This transformer has various secondary impedances that may be selected for maximum transfer of power to the load. An a.c. ammeter in series with the load indicates when the transformer tap giving the largest output current has been selected. A switch across the meter is provided to cut the meter out of the circuit if desired.

The power for the amplifier is also supplied by the external storage battery. The battery operates a Vibropak power supply to provide the high voltage for the tube. The entire assembly is housed in a steel box except for the storage battery and battery cable. The controls consist of the gain control knob, a meter switch, and rotary selector switch, which turns on the transmitter and also matches the load for maximum current output.

This increase in the power of the transmitter enables the operator to search for holidays five or six miles in each direction from the transmitter. Of course, this is subject to the condition of the soil and the protective coating and the distance is considerably less for a coating

Fig. 2. The miniature receiver used with the transmitter above is about the size of a cigarette pack and weighs only 1.1 lbs.

in poor condition. The high current output of the transmitter and the buffering action of the amplifier on the vibrator make it possible to use it for locating shorts in cathodically protected systems. The transmitter will supply as much as 2.9 amperes if properly matched to a shorted-out system.

The transmitter has been in use by the pipe protection laboratory of the Southern California Gas Co. for over a year with the only maintenance required being the replacement of one tube and it has proved to be a very useful and successful instrument.

The Pearson detector receiver is essentially an audio frequency amplifier, which increases to headphone volume the small voltage difference picked up from the surface of the earth in the vicinity of a holiday by the spiked shoes of the operators. Because the receiver is often carried for many miles, sometimes over rough terrain, a very light weight receiver was desired.

So a receiver weighing only 1.1 lb, including batteries, was built around a three-stage, sub-miniature tube printed circuit amplifier. The amplifier is powered by a 1.5-volt flashlight battery and a 22.5-volt hearing air battery.

The output of the amplifier is fed directly to magnetic headphones, and also through a rectifier, to a 1-in. diameter microammeter. The output meter is provided for pinpointing a holiday as the maximum tone intensity can be more precisely determined by eye than by ear. There is no selective filter in the receiver but low frequency interference is attentuated somewhat by a capacitor-resistor voltage divider in the input circuit.

To the right of the meter in *Fig. 2* is the on-off switch and volume control knob; to the left, the headphone jack. Below the meter is a three-position lever switch that converts the output meter into a voltmeter for measuring the battery voltages. This switch is so connected that the battery voltages can be read only while the amplifier is operating. The input connections are at the opposite end of the receiver.

No particular method of carrying the receiver has been selected, but it is easily carried in one hand or can be attached to the belt. Two of these receivers have been built so far. Limited field experience shows a battery life of several days and very satisfactory performance.

This article is adapted from a paper presented at the technical services conference of the PCGA in Los Angeles, Feb. 18-19.

Thermally Thinking

(Continued from page 30)

able; 20 (4%) were neutral. The 384 who made no comment comprised 77.6% of the group.

Presumably the results were at least as good as might be expected, probably better. The opposition is always the more vocal in matters of this sort, so the large numbers of "neutral" and "no comment" are encouraging.

Interviewers left each customer who mentioned the increase a copy of an excellently executed booklet titled "Here's Why" to explain the need for the boost.

New York inspection law

New York City gas utilities last month were fighting strenuously to prevent passage of a proposed inspection law introduced into the city council by Joseph T. Sharkey of Brooklyn and sponsored by the Joint AFL-CIO committee for gas safety. The bill would require public utilities to inspect annually all home appliances for which they serve gas.

For Brooklyn Union alone, this would mean that 3 million appliances would have to be looked over every year, a task that would require the formation of what the company termed "a gigantic inspection bureau," which would be a tremendous burden on both company and rate-payer.

ConEd expressed doubt as to the constitutionality of such a measure.

Jerome Trichter, assistant commissioner of health, who has carried on the city's fight to clean up a situation that has claimed the lives of 408 persons since 1950, was quoted as saying that "the principle of private inspection would go a long way toward preventing accidents and damage to health." Mr. Trichter has had 120 city inspectors on the job for 18 months, but has only been able to cover the area of Manhattan south of Central Park. Bad areas in Brooklyn, Queens, and the Bronx haven't even been touched as yet, he said.

In essence the bill provides that, in addition to making annual inspections, the companies: make adjustments that do not require repair or replacement of parts; shut off gas supply where corrective adjustment is impossible; maintain public inspection records; maintain around-the-clock inspection departments.

The companies weren't alone in opposing the bill. The *World Telegram*, a leader in the campaign to cut the death toll, thought the bill would cost too much money and would not provide a means of rectifying post-inspection complaints. The newspaper suggested training and city licensing of repairmen as one substitute.

States act on gas bills

Gas, in February, was continuing to flare up in state legislative debates all over the nation.

Most of the attention was riveted on Texas, of course, because that's where most of the gas comes from. What Texas does with its gas affects people from California to New York. A late report on this key state appears on page 58.

Elsewhere, however, things were far from quiet:

Indiana was considering repeal of the 1947 public utility anti-strike law, which provides for compulsory arbitration. Also under consideration was a bill requiring that rate hearings be conducted in the area to be affected.

Illinois had three bills proposing creation of an agency empowered to resist petitions for rate increases—not, said author Marshall Korshak, to obstruct but to "represent the public interest vigorously."

Wisconsin had a similar bill up for study.

Rhode Island was thinking of exempting utility sales from the state sales tax. A similar bill exempting heating fuels that go into the manufacture of finished products was defeated in Georgia.

Pennsylvania received a bill to tax natural gas sales at a rate of 7 cents per Mcf and natural gas pipelines on a per-mile basis, with a sliding scale ranging from $30 to $100, depending on diameter. Proceeds would pay for a $44 million veteran bonus bond issue.

Kentucky was studying a proposal to force all utilities to report serious accidents to persons or property, resulting from utility service.

Rhode Island was debating a bill creating a special commission to study the state's laws covering public utilities.

West Virginia's governor proposed a severance tax on natural resources. For gas, the rate would be 1 cent per Mcf.

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Announced in LIFE March 30
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Makes Ice Cubes Without Trays!
AND PUTS 'EM IN A BASKET
ALL AUTOMATICALLY!
THE MOST SENSATIONAL ADVANCE IN HOME REFRIGERATOR HISTORY!
STARTS ITSELF!
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3 GREAT APPLIANCES IN 1
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NO TRAYS TO FILL!
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SERVEL: THE NAME TO WATCH FOR GREAT ADVANCES IN REFRIGERATION AND AIR CONDITIONING...

Model 1139

TIE IN! MAKE '53 A GOLDEN YEAR FOR KITCHEN LOAD!

Never before has *any* gas appliance manufacturer given such powerful support to your drive for year 'round load! Nothing less than full-color pages in 24 national magazines! Big-space newspaper campaign in 109 cities. Thousands of radio-TV spots! Concentrated billboard showings in key markets! Servel's reaching *every* prospect with the news of the most sensational refrigerator since the invention of the silent, no moving parts freezing system—the revolutionary new Servel Automatic Ice-Maker Refrigerator! Seize this chance to take kitchen load right out of competition's grasp! Display Servel! Promote Servel! CALL YOUR SERVEL DISTRIBUTOR TODAY!

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THE NORMAC BELL JOINT CLAMP

A SIMPLE SOLUTION for one of the GAS INDUSTRY'S *most trying problems*

Solves Your Joint Repair Problems • Quick • Easy • Permanent

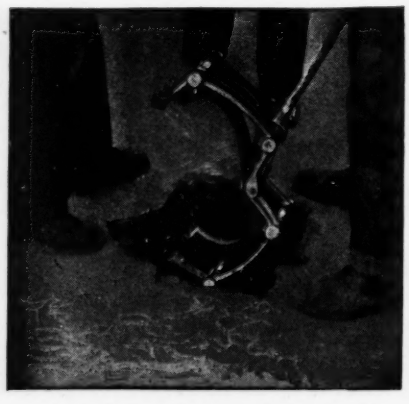
Installed in small pavement openings. Available in all standard sizes from 3" to 12". A simple set of tools cleans the joint, installs the clamp . . . often in only a quarter of an hour. SAVES TIME. SAVES MONEY and the repair is permanent. Designed for all conditions particularly where pavement repair costs are prohibitive. Such small opening repairs are scarcely noticeable when pavement is replaced.

Normac Clamps can be installed in large as well as small openings.

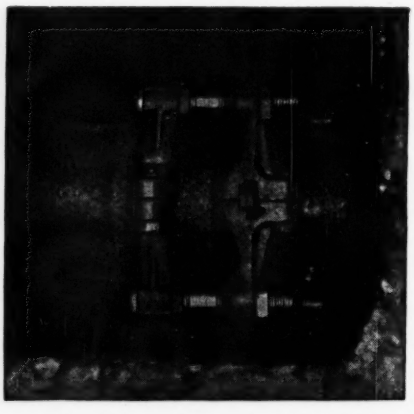
Norton-McMurray hold definite leadership in the development of methods for installation and rehabilitation work through small openings. We welcome the opportunity to help solve a problem you may have—tell us about it.

Write for our catalog describing our complete line of

COUPLINGS . . . FITTINGS . . . SERVICE TEES and ELLS . . . SLEEVES . . . COMPRESSION-END COCKS . . . METER BARS and BRASS FITTINGS for copper pipe.



6 inch Normac Clamp being lowered into hole for installation



6 inch Normac Clamp in service after installation

NORTON-McMURRAY MFG. CO.

122 SOUTH MICHIGAN AVENUE • CHICAGO 3, ILLINOIS

Method and product covered by U.S. Patents, Nos. 2,163,261 and 2,178,286.

Utah would set up a state oil and gas conservation commission to prevent waste and provide for orderly development of oil and gas under Senate Bill 14.

Arkansas had several utility bills in the hopper. One would levy a 1% gross revenue tax on all public utilities. Two others would prevent rate increases from being put into effect by filing bonds; one would suspend proposed increases for six months, after which they might be put into effect under bond if the state PSC hadn't completed investigation of the petition; the other would simply ban rate boosts until the probe was finished. Another bill would nick utilities for the costs involved in considering rate increases. Specifically, PSC would be directed to determine how much the utility intended to spend in prosecuting its petition for an increase, and would order the utility to pay the commission a like amount to defray the expense to the state of hearing the case.

Maine heard a retiring PUC official ask for legislation to permit the agency to determine rates on a "net investment rather than a current cost basis."

New Mexico had a bill to regulate and license oil and gas pipeline companies, repeal a 1927 state law taxing such companies, and terminate the state's four-year court fight over application of the 1927 act.

Colorado was wrestling with ways and means of taxing oil and gas production. One suggestion was a straight 5% levy.

Sales Pitches

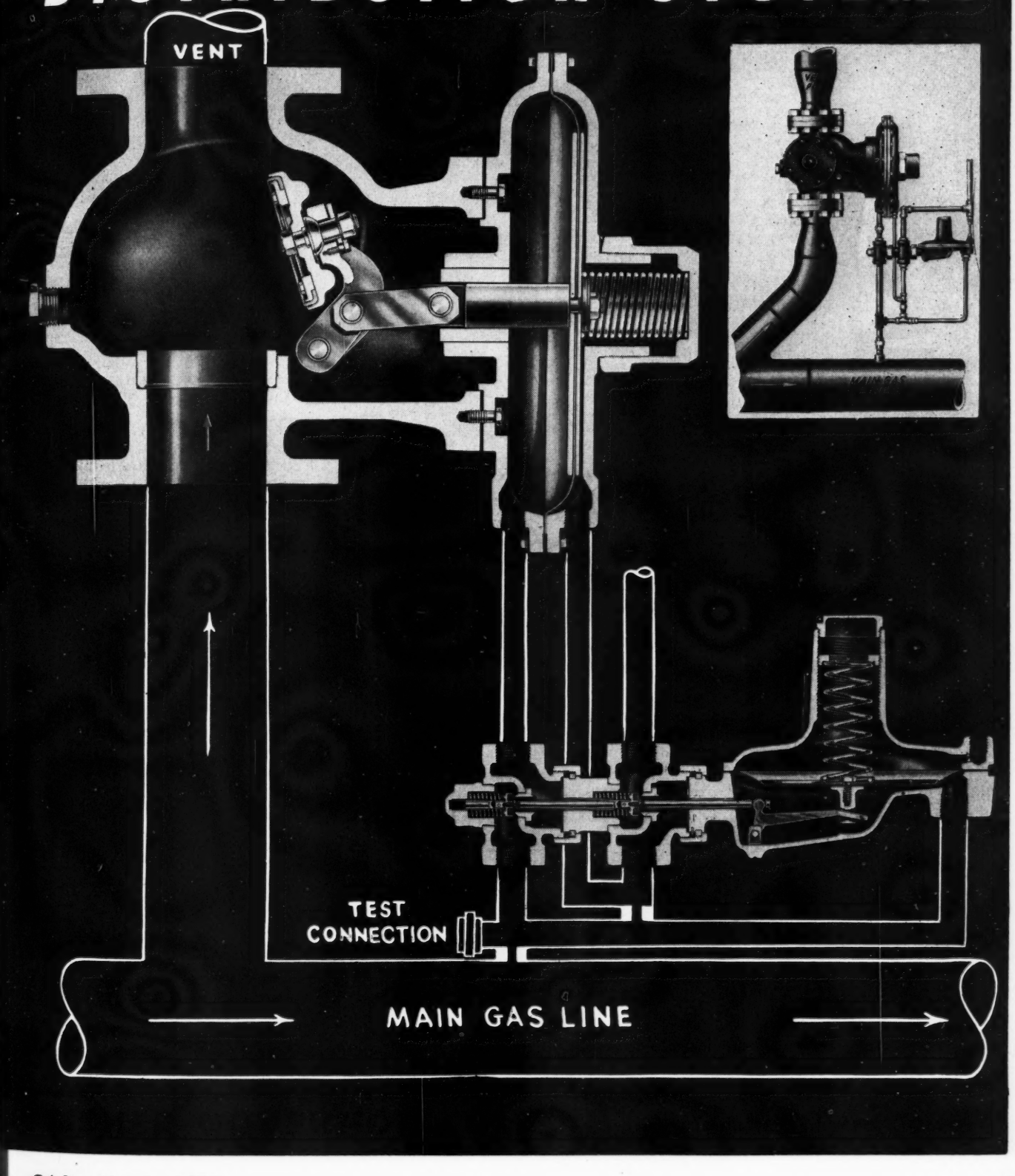
GAMA predicts big year ahead

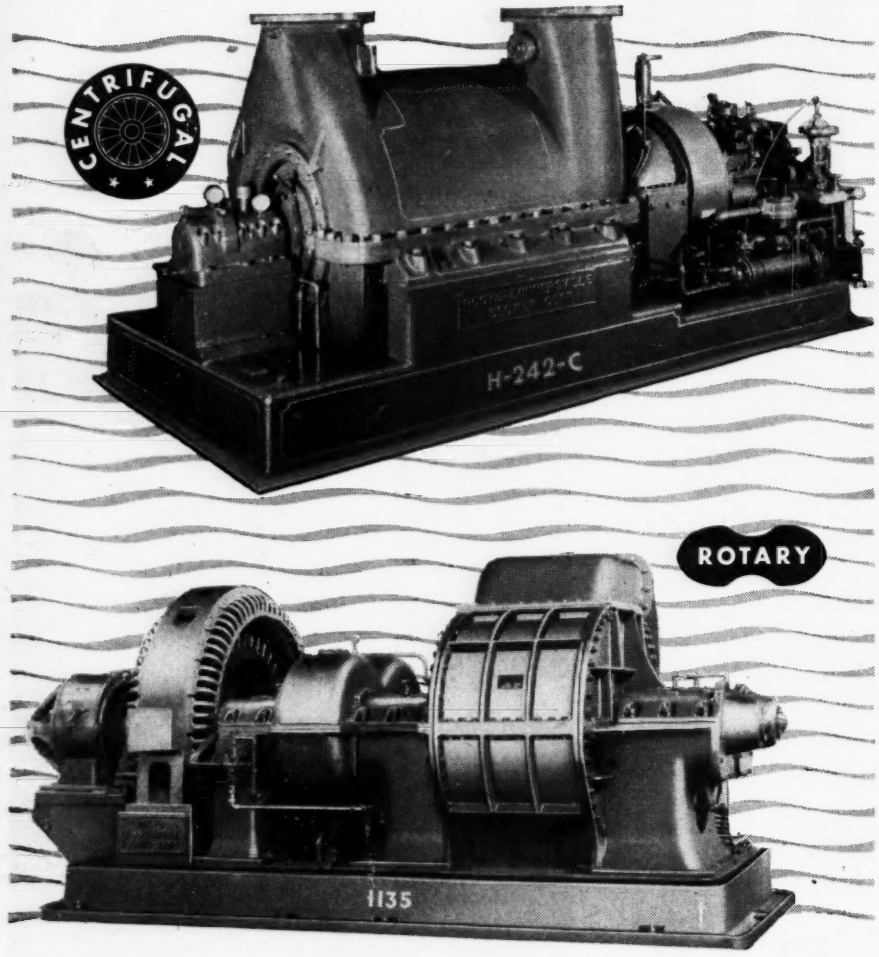
A better gas appliance sales year in 1953, picking up its momentum from the last half of 1952 but falling considerably short of 1950's records, is forecast in GAMA's annual "general business outlook" survey. Based on the results of a December poll, the summation was released in mid-February by Statistician Edward R. Martin.

Most substantial gains are forecast for incinerators and clothes dryers, two relative newcomers, which are only now being strongly promoted nationally. Among the well established items, such heating equipment as recessed vented

RELIEF. . .

DISTRIBUTION SYSTEMS





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The long record of reliability established by Roots-Connersville Blowers, Exhausters and related equipment is the natural result of almost a century of experience in the exclusive business of handling gas and air for industrial purposes.

But its more than just designing and building *a* piece of machinery. Such user satisfaction comes also from the wide range of capacities and types, from which the right unit can usually be selected. Especially important, our *dual-ability line* of Centrifugals and Rotary Positives enables us to make unbiased recommendations . . . a *dual choice* available only from Roots-Connersville.

Whatever your need may be in the handling of air or gas for industrial purposes, you can look to Roots-Connersville for unquestioned reliability and long-time economical performance. Ask us for specific recommendations on any problem of handling gas or air—in any quantity.

ROOTS-CONNERSVILLE

Exclusive Specialists in Handling Gas and Air

BLOWER BUILDERS SINCE 1854

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wall heaters, with an expected gain of 17.1%; boilers, with 12.2%, and direct heating equipment, with 9%, lead the parade. As a whole, central heating equipment is expected to be up only 4%.

Range shipments should rise 5.8% to 2,230,000 units, well under 1950, and automatic water heaters may gain 4%, hitting just under 2 million units, the manufacturers believe.

Most appliance makers are planning defense contract cutbacks in 1953, but expect appliance demand to bridge the loss in revenue.

In general, manufacturers participating were solidly optimistic—this in contrast to a year ago, when attitudes ranged from moderate to extreme pessimism. A mid-1952 survey, however, had shown a happier tone, and the final half-year's performance bore this out. As a whole, predictions for the year were remarkably accurate.

Repeat Matchless range campaign moves 2695 ranges

Philadelphia Gas Works ran a repeat on its "Matchless" gas range campaign in the fall, and judging from the report of Sales Director Frank Trembly, it was another real shot-in-the-arm for single point ignition.

Six range makers participated, along with 533 dealers, and the three-month drive moved 2695 single point ignition ranges. PGW now has more than 5000 such models on its lines, and incidentally, it has encountered less service headaches with these ranges than with multiple-point cookers.

The utility went all-out in advertising and promotion. More than 90,000 lines of advertising appeared; television was used thrice weekly; 107 cooking schools brought in a total attendance of 17,437 women.

Dealers accounted for the bulk of the sales—1918, or 72%. During the drive, "Matchless" ranges led the parade among all models, with the utility's own sales going 75% to single point during the drive and continuing at a 65% rate after it ended. More than 30% of all retail sales in the entire area were single point ranges.

PGW's primary aim was to upgrade customers' equipment. Already 95% of domestic cooking in Philadelphia is done with gas. But with a program directed at obtaining customer and dealer acceptance of the single point ranges, the utility broke open a promising replacement market, wherein 60% of all ranges are more than six years old.

Humphrey

Automatic GAS UNIT HEATERS

Help Industry to Keep the Wheels Turning!

In a factory, you can install Humphrey Automatic Gas Unit Heaters quickly and economically. You need no fuel storage tanks, no boiler, no steam or hot water lines.

Humphrey Unit Heaters are operated only when heat is needed — shut off when not needed. No wasted heat, no unnecessary fuel expense. Maintenance is negligible, due to such exclusive features as the Dust-Proof Pilot and the Free-Flow Heat Exchanger — no tubes requiring cleaning.

In all kinds of industrial and commercial buildings, Humphrey Gas Unit Heaters have proven through years of good service that they heat the best and cost the least.

Complete range of sizes available, with blower or propeller type fan. Write for literature.

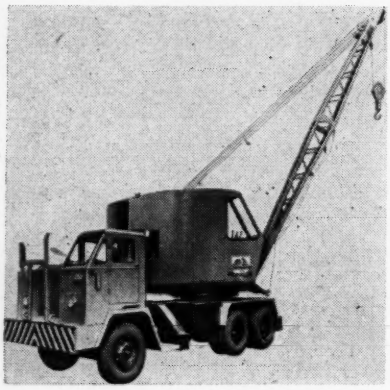
HUMPHREY PRODUCTS

GENERAL GAS LIGHT COMPANY • KALAMAZOO, MICHIGAN

23 Warren Street, New York City • 2nd Unit Santa Fe Building, Dallas • 225 Eleventh Street, San Francisco

New Products and Trade Literature

To secure further information on products or new literature, simply fill out the coupon and mail, indicating by number the information or literature needed.



1 Shovel Crane

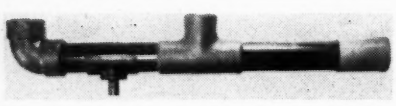
Twenty percent more lifting capacity than previous Bantam models is offered in a new, heavy-duty truck-mounted shovel crane. Rated at 6-ton capacity, the ⅜-yd Model T-35 has a complete line of matching attachments including shovel, clamshell, dragline, back hoe, magnet, wood grapple, and pile driver.

Improvements include a stronger main frame with a 54% increase in section modulus; larger shafts and bearings; bigger diameter center pin; trunnion base with wider trunnion rollers; and four adjustable cam-type hook rollers. Increases have been made in drum clutch, swing clutch, drum braking and boom hoist braking surfaces.

A power boom hoist is standard equipment. The crane can be mounted on any tandem axle truck having a wheel base of 164 in. or more.

Schield Bantam Co.

■



2 Fittings

With the development of a line of Fibercast fittings made by low pressure molding of polyester resins reinforced with glass fibers and glass cloth, Perrault Fibercast Corp. is now offering its Fibercast pipe for use in gas mains.

The fittings are available in two sizes, 3½ and 4 in. OD with 100- and 200-lb working pressure. A 90° ell, tee, and service connection for mains permit tapping the main under pressure. Service connections feature the Perrault snap-on application with Weldfast chemical weld between connection and pipe. The 3½-in. size may be tapped and threaded to receive ½-in. nominal or 2⅜-in. OD pipe. The 4½-in. fitting can receive ½-in. to 3½-in. OD pipe.

The fittings are light in weight, will follow the contour of the ditch without taking permanent set, have high impact strength and no cold flow.

Perrault Fibercast Corp.

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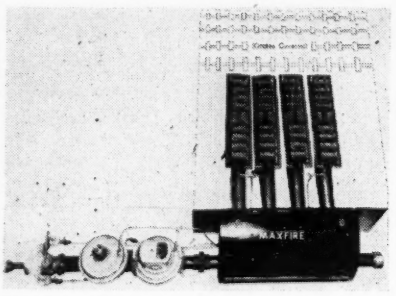


3 Conversion Burner

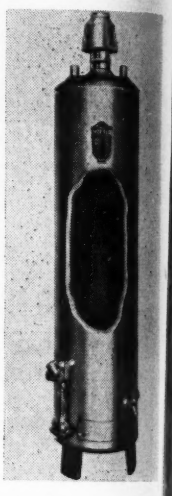
A new commercial gas conversion burner for apartments, business buildings, schools, churches, factories, etc., is equipped with air-gas proportioning valves that automatically adjust the air-gas input according to the load required. Burner capacity ranges from 400,000 to 2 million Btu.

Every Maxfire burner is equipped with shut-off valve, gas pressure regulator, electric main gas control valves, transformer, safety pilot or raw pilot for each burner head, pilot shut-off valve and gas pressure regulator and filter, and thermostat.

Gas Research Inc.

■

4 Water Heater



A ½-in. stone lining for the prevention of rust and corrosion is featured in a new underfired automatic gas water heater. Available in two sizes, 30- and 45-gal. capacities, the Mor-Flo heater has a one-piece flue baffle of heavy-gauge steel extending the height of the tank for maximum heat transfer. It is also equipped with a snap-action, dial-type thermostat and a one-piece, raised-port type burner.

According to the manufacturer, the stone lining, because of its lack of affinity for minerals, provides maximum protection against lime or scale deposits.

Mor-Flo Heater Corp.

Mail this Coupon for **NEW PRODUCTS INFORMATION** **COPIES OF NEW LITERATURE**

GAS, 198 S. Alvarado St., Los Angeles 4, Calif.

3/53 Fill in numbers of items in which you are interested.

No. ..... No. ..... No. ..... No. .....

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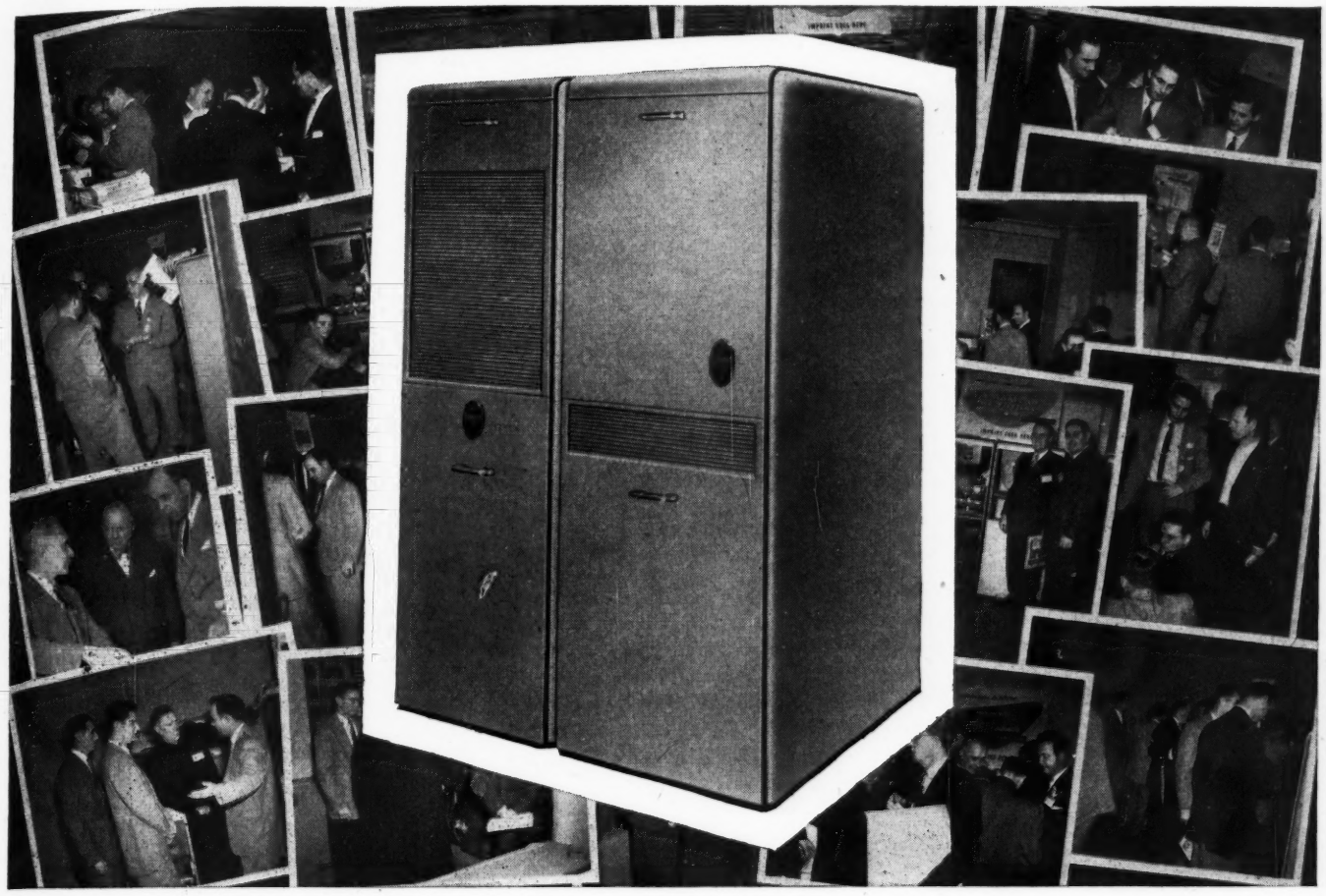
"COMMAND-AIRE" TWINS GET BIG RECEPTION AT NAHB SHOW!



Builder enthusiasm over truly Low-Cost year 'round conditioning promises an active market for you!

Builders enthused — as you will — over these unique features of Bryant's new "Command-Aire" Twins. For example, imagine *your* profit potential in year 'round home conditioning equipment that's . . .

20 to 35% lower in cost! Mass production techniques enable us to offer the "Twins" at a price millions of average income families can afford . . . families who will buy new homes (or convert old heating systems) in your area this year. Moreover, they will have the convenient option of buying . . .

Cooling initially — or later! Because the "Twins" are independent heating and cooling units, you can install the furnace first and add air conditioning immediately or later, according to the convenience of the buyer. And you can be sure about demand because the "Twins" are being . . .

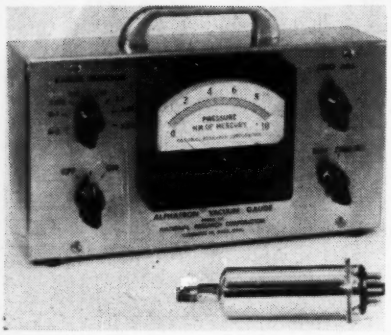
Extensively advertised — on national and local levels — even right on the home site — to pre-sell thousands who will buy new homes this year.

Available in many combinations! Gas or oil furnaces ranging from 50,000 to 175,000 Btu/hr and cooling units in 2, 3 and 5-ton capacities permit you to meet the conditioning needs of any sized house.

Get complete information on this unusual profit opportunity today! Contact your Bryant Distributor, or write: Bryant Heater Division, 17825 St. Clair Avenue, Cleveland, Ohio.

bryant®

HEATING • AIR CONDITIONING
WATER HEATING



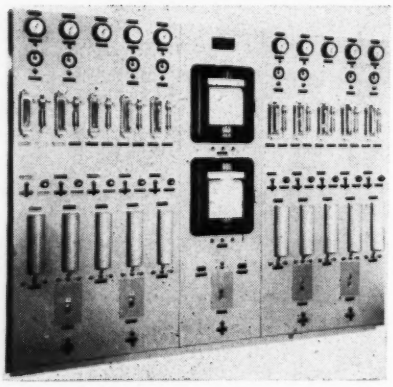
5 Vacuum Gauge

Suitable for vacuum coating units, furnaces, stills, drying and impregnating units, test chambers, and pumping systems, a new vacuum gauge measuring absolute pressures from atmospheric down to 0.0001 mm is now available. The Type 511 Alphatron gauge employs a shielded radioactive source as its principle of operation. Alpha particles ionize the gas and the ionization current produced is measured by a d.c. amplifier that is calibrated to give absolute pressure in millimeters of mercury.

The power supply, high stage amplifier, range selector, and output meter are incorporated in a stainless steel housing. Dependence on outside power supply is eliminated by the use of batteries. Increased range is claimed as an outstanding feature of the gauge and accuracy is plus or minus 2% of full scale. The gauge is also useful as a leak detector and may be used as a laboratory instrument.

National Research Corp.

■



6 CO Detector

Capable of accurately measuring from zero to five parts per 10,000 of CO in the air, this carbon monoxide detector indicates when and where blowers must be turned on for maximum safety and efficiency. It may be used to control blowers directly and give completely automatic protection.

Requiring neither special skill nor training, the detector, with slight modifications, can be used to safeguard against combustible or explosive gases. It is fully automatic, requiring no direct supervision.

Claimed to be the first CO detector that uses no driers, it features a high temperature hopcalite reaction that eliminates interference caused by moisture. An alarm may be incorporated into the detector to indicate when the concentration of carbon monoxide reaches dangerous proportions, or the equipment may be used to control a ventilation system.

Taller & Cooper Inc.

■

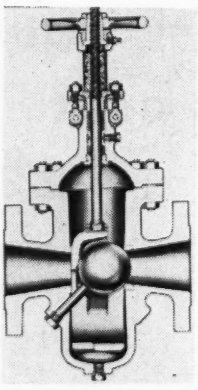
7 Clothes Dryer

The fully automatic "Dry-Aire" gas clothes dryer was introduced by the Geo. D. Roper Corp. at the Chicago Furniture Mart in January. Features of the dryer include Jumbo lint trap, Tornado exhaust, single dial control, automatic ignition, Zephyr-Aire drying, and Ozonic lamp. Economical operation at modest cost is claimed.

Geo. D. Roper Corp.

■

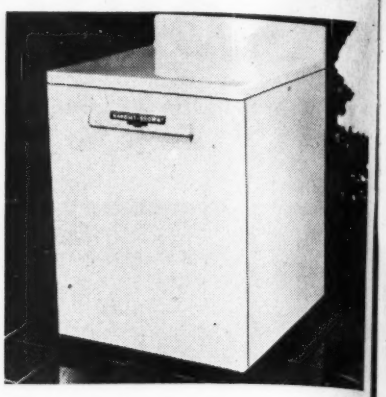
8 Ball Valve



A ball-shape disc is the outstanding feature in a new line of venturi ball valves introduced by Crane. The ball is not attached directly to the stem but rides in a cage attached to the stem by a tee-head slotted construction. In operation, the ball is moved to and from the center of flow and rolls into and out of the body seat.

The manufacturer states that the design provides unusually accurate flow control with a minimum of wire-drawing; straight-through flow with low pressure drop; absolutely tight shut-off; easy operation; and freedom from vibration or chattering. The valves are available in venturi patterns with flanged ends, in cast carbon steel and Crane 18-8 Mo alloy steel. Sizes begin at 1 in. Cast steel valves are available in 150-, 300-, and 600-lb classes; alloy valves in 150- and 300-lb classes.

Crane Co.



9 Water Heater

A new table-top water heater, the "Hi-Lo Imperial," features a full 30-gal. capacity with an optional high input of 30,000 Btu. Low input allows unvented installation and conversion to either high or low input can be made with factory supplied parts. All fittings, supplied with the unit, and the built-in draft diverter are located just below the top as is the high-tensile steel tank.

Features include a hand-size cleanout port, bucket high drain cock, 100% safety shut-off control, and the Uniflame burner. Flush-to-wall installation is possible in old structures as well as new.

Designed for conformity to standard kitchen appliances and equipment, the water heater is 24 in. wide, 25 in. deep, and has an overall height of 40 in. The Hi-Lo Imperial is available with magnesium rod protection.

Handley-Brown Heater Co.

■

10 Dishwasher-Range

The Dishwasher-in-a-Range, introduced by Cribben & Sexton at the Chicago Furniture Mart, incorporates the James mobile automatic dishwasher in a completely automatic Universal gas range.

The dishwasher fits in the space usually occupied by the Universal Wheel-about kitchen cart. Features of the washer include correction of its own water temperature and pressure, sterilizing and radiant heat drying and water economy. The unit requires no installation, plumbing, wiring, or cabinet work.

Cribben & Sexton Co.

Sensational!

SPECTRO-MATIC COOKING

Select by color the exact top burner heat desired . . . precision flame control . . . fingertip accurate . . . an unlimited choice of flames . . . exactly right for every top cooking operation.

YELLOW... KEEP-WARM

ORANGE... FULL SIMMER

RED... FULL ON

BLUE... OFF

ROPER

AUTOMATIC

Gas Range

In "Spectro-Matic" cooking, ROPER offers a fresh, new idea that is capturing the imagination of housewives everywhere. This significant feature, coupled with a long list of other ROPER exclusives, gives you a real advantage when you sell ROPER Gas Ranges. Now is the time to learn about the entire ROPER line. Just write us and say "I'm interested". Geo. D. Roper Corporation, Rockford, Illinois. Why not write today?

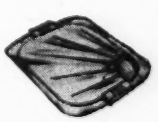
BUILT TO CP STANDARDS

THESE REMARKABLE NEW ROPER FEATURES ALSO ARE IN DEMAND

Get on the Profit Band-Wagon... Write about the Attractive Roper Franchise

Alltrol "Center-Simmer" Top Burners with "Keep-Warm" Flame

"Insta-Set" Panel with "Insta-Matic" Clock, Timer, Light and Convenience Outlet



Extra-Capacity Comfort Level Broiler with "Serv-Hot" Grill and Serve Tray

"Bake-Master" Oven with Automatic Heat Control and "Scientific" Cooking Chart

Trade Literature

11 Tape Folder

A recently published folder describes Trantex Tape, a new cold-applied pipeline wrap developed by Johns-Manville for corrosion protection for underground gas and oil pipelines and overhead piping. Fully illustrated, the folder contains reference tables on the properties of the wrap.

Johns-Manville

■

12 Nozzle Bulletin

Complete technical details on a line of Schutte & Koerting atomizing and spray nozzles are contained in a new 20-page bulletin. Information includes construction details, spray characteristics, and capacities in addition to dimension tables, capacity charts, and drawings.

Schutte & Koerting Co.

■

13 Purifier Bulletin

Small-line type purifiers used for removing dirt, solids, moisture, etc., from steam, vapor, compressed air, and gases are described in a recently published bulletin. Installation photos illustrate equipment arrangement and a blueprint drawing shows piping layouts. The drawings, selection tables, dimensions, and capacities may be helpful in planning installations.

V. D. Anderson Co.

■

14 Ion Exchanger Folder

The role that the ion exchanger is playing in industry is explained in a new bulletin, "Demineralization Including Silica Removal by Ion Exchange." The 28-page bulletin describes the chief applications, principles of operation, design features, advantages, recommendations and specifications of Permutit's demineralizing and silica removal apparatus and synthetic resins.

Permutit Co.

■

15 Corrosion Brochure

Designed to help solve corrosion problems, a new illustrated brochure from Tapecoat presents details on how and where coal tar protection can be used to best advantage and case histories to show how corrosion problems have been overcome in many fields.

Tapecoat Co.

■

16 Boiler Catalog

Eclipse Type D "Steamboilerplants" are described in detail in a new eight-page catalog recently published by Eclipse Fuel Engineering Co. In addition to specifications and dimensions on the automatic gas-fired, gas-designed boilers (ranging from ¾ to 7 bhp), the catalog presents pump unit and condensation unit specifications.

Eclipse Fuel Engineering Co.

■

17 Transmission Catalog

Pneumatic, magnetic, electric, electronic, and electronic-follower transmission systems for use in measurement and control of flow, pressure, liquid level, viscosity, and specific gravity have been described in a new Fischer & Porter catalog. The catalog is profusely illustrated and contains performance characteristics and schematic diagrams of the various systems.

Fischer & Porter Co.

■

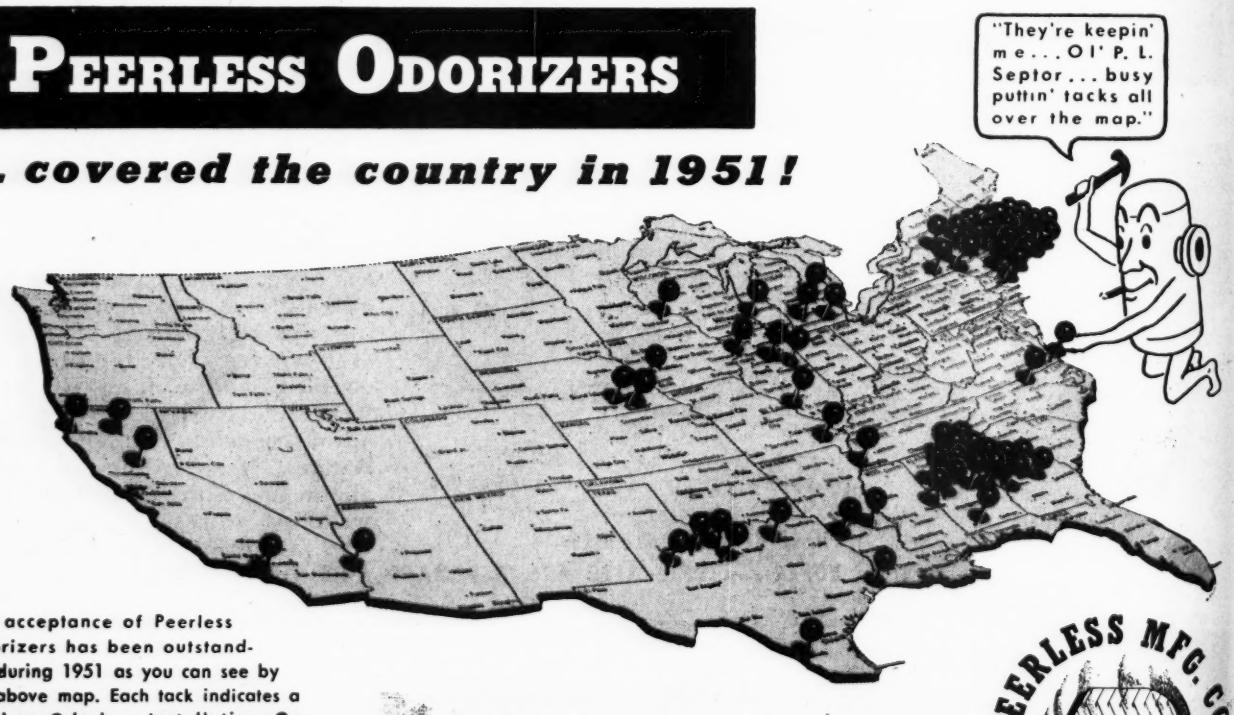
18 Tar Base Bulletins

Five bulletins describing Pittsburgh Coke & Chemical Co.'s Pitt Chem 100 series of tar base protective coatings have been announced. One bulletin gives specifications, uses, and methods of applying all four coatings in the series while the four other bulletins give detailed information on each coating in the series.

Pittsburgh Coke & Chemical Co.

PEERLESS ODORIZERS

. . . covered the country in 1951!



The acceptance of Peerless Odorizers has been outstanding during 1951 as you can see by the above map. Each tack indicates a Peerless Odorizer installation. Gas Companies are finding Peerless Odorizers accurate for metering odorant into natural gas lines. Operational costs are reduced to a minimum.

PEERLESS MFG. CO.

FOR FULLY ILLUSTRATED INFORMATION AND FACTS, CONSULT YOUR PEERLESS REPRESENTATIVE OR WRITE

PEERLESS MANUFACTURING CO.

P. O. BOX 7193 ★ DALLAS, TEXAS ★ DIxon-843

REPRESENTATIVES IN ALL PRINCIPAL CITIES

EMPIRE SELLS BEST
BECAUSE EMPIRE
BUILDS BEST

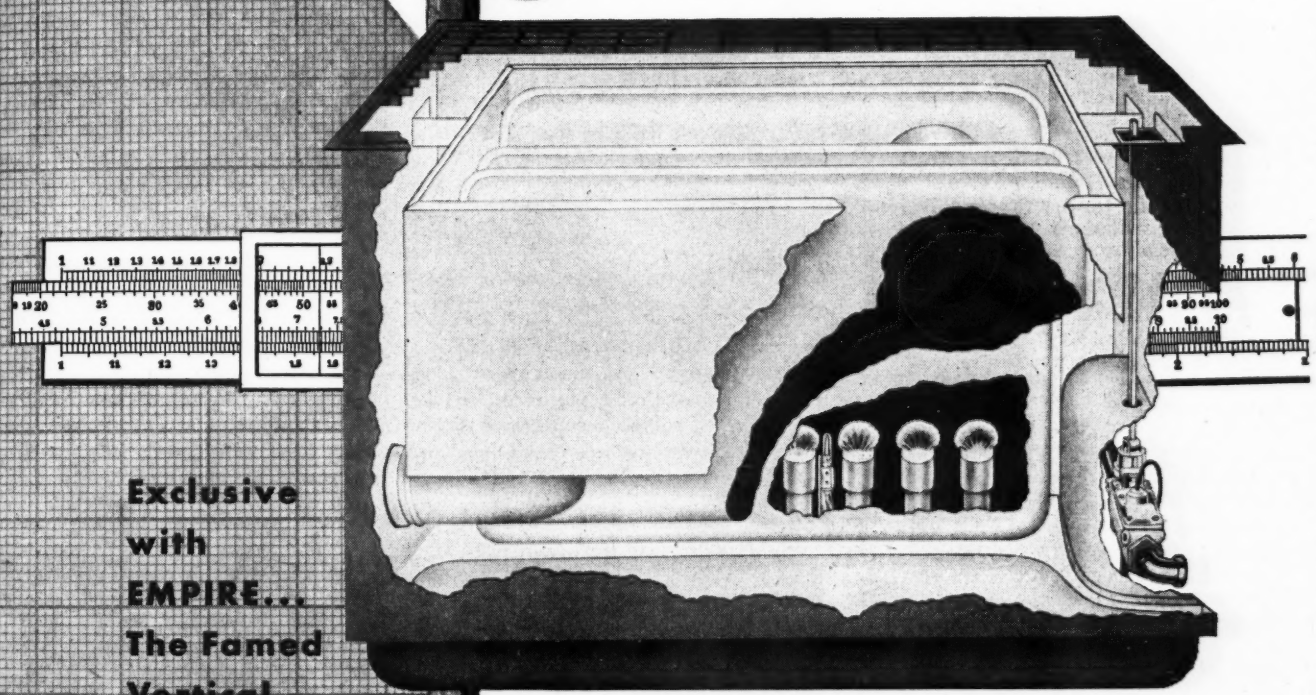
Dealer or builder . . . you'll please your customers best with an *Empire!*

Patented Vertical "Thriftmatic" Gas Burner is precision-machined to provide *more heat for less money!*

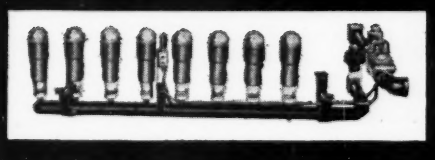
Empire's heat exchangers cut noise to a new low. No boom, no bang . . . silent as a kitten!

Burns all types of natural, mixed and L-P gases. No basement needed . . . no expensive excavating! Really *economical* to install and maintain.

You and your customers can *depend* on Empire . . . world's largest manufacturer of *gas* floor furnaces.



Exclusive with EMPIRE... The Famed Vertical "Thriftmatic" Gas Burner



EMPIRE STOVE COMPANY
BELLEVILLE, ILLINOIS
"Nationwide Distribution To Heat a Nation"

SEE YOUR EMPIRE REPRESENTATIVE OR WRITE TO EMPIRE

KRALOY
PIPE & FITTINGS

COMPLETE

DISTRIBUTION SYSTEMS

MAINS, SERVICE TEES, SERVICES

PHOTO OF INSTALLATION BY TUCSON GAS & ELECTRIC CO., TUCSON, ARIZONA

No Corrosion!

Kraloy will not rust, is impervious to all types of soils, and is not subject to galvanic corrosion.

Low-Cost Installation

No welding or field wrapping is necessary. Installations are simple, rapid, inexpensive.

No Maintenance

Properly installed Kraloy systems eliminate all maintenance causes except damage by excavating equipment.

*LIGHT-WEIGHT. Easier to handle. 8 times lighter than steel, 15 times lighter than copper.

*TRANSPARENT. Permits visual inspection of joints.

*GREATER CARRYING CAPACITY. Smooth, frictionless. Can carry 20% more than steel pipe.

*FASTEST REPLACEMENT for corroded steel service. Kraloy pipe can be inserted in old steel services.

Kraloy is the most experienced manufacturer of plastic pipe and fittings for the gas industry. Over 3 million feet of Kraloy in use by prominent gas utilities.

STOCKED BY

Crane Co. • Howard Supply Co.
National Supply Co. • HOMCO
Mine Supply Co.

Write for technical data and installation details

Kraloy Plastic Pipe Co., Inc.
4710 East Washington Boulevard
Los Angeles 22, California
Gentlemen: Please send me complete information on Kraloy Pipe and Fittings.

NAME_____

FIRM_____

STREET_____

CITY_____ ZONE____ STATE_____

People

Promotions

JOHN C. JACOB JR. has been elected executive vice president of the Peoples Natural Gas Co., Pittsburgh. Since 1942 he has been vice president and assistant manager of Peoples and New York State Natural Gas Corp.

JOHN SILVER, formerly general manager of the communications and electronics division of Motorola Inc., has been promoted to the post of vice president in charge of operations of the division. He has been with Motorola since 1944.

Paul Harris
Schield Bantam

John Silver
Motorola

PAUL HARRIS has been appointed district manager for the Schield Bantam Co., Waverly, Iowa. With headquarters in Atlanta, Mr. Harris' territory will include eastern Tennessee, the Carolinas, Alabama, Georgia, and Florida.

As a vice president of Southern Counties Gas Co., LUDLOW SHONNARD JR. will direct the personnel and claims departments and will be responsible for industrial relations aspects of the company's business. Previously he was manager of personnel and claims.

JOHN W. FREUND has been named Detroit sales engineer for the Metal Products division of Koppers Co. Inc., Baltimore, reporting to the division's district sales office in Chicago.

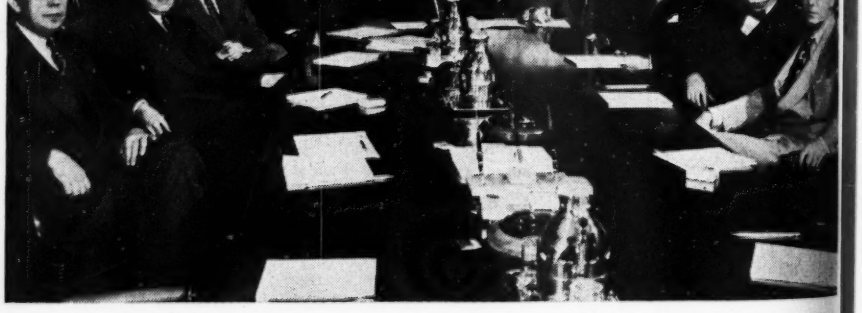
ANDREW F. CASSIDY, for the past four years sales manager of water heaters and boilers, has been appointed general sales manager for Rheem Manufacturing Co., New York.

W. E. BAKER retired recently as vice president and assistant to the president of Servel Inc., Evansville, Ind. Mr. Baker joined Servel in 1934 as vice president in charge of manufacturing. Servel has also announced that PAUL R. KENNEDY has become southern manager for the public utility division with headquarters in Atlanta.

O. J. RESS has been appointed chief engineer and N. E. HILL manager of product engineering of the L. J. Mueller Furnace Co., Milwaukee. Mr. Ress formerly was research director and Mr. Hill has been chief designer for the company.

Eureka Williams Corp., Bloomington, Ill., has named ANDREW F. WARD, formerly Gas-O-Matic sales manager, to the post of general sales manager of the Williams division.

G. A. PLUMMER is the new west Texas district manager of the Lone Star Gas Co. and Lone Star Producing Co. with offices in Midland, Texas. New headquarters have just been established there and the exploration and gas supply district set up. All activities around oil and gas developments in west Texas and New Mexico will be handled out of the Midland office.



Members of the corporate secretaries committee of the AGA held their first meeting in New York recently. They are (left to right): R. E. Palmer, Consolidated Natural Gas; R. M. Drevs, Peoples Gas Light; B. H. Harper, Northern Natural; Kurwin R. Boyes, AGA; Dale Parker, Columbia Gas, committee chairman; L. L. Schlosser, Michigan Consolidated; R. B. Loomis, Brooklyn Union; M. J. Coughlin, Hartford Gas; Roy L. Thomas, Colorado Interstate.

H. K. Merker
Brooklyn

E. F. Barrett
Long Island

After a 21-month tour of duty with the air force, HERMAN K. MERKER has returned as assistant to the chief engineer in the production and engineering division of Brooklyn (N. Y.) Union Gas Co.

EDWARD F. BARRETT has been named chairman of the board of Long Island Lighting Co., Mineola, N. Y. ERROL W. DOEBLER succeeds him as president and chief executive officer and EDWARD C. DUFFY, formerly assistant vice president in charge of electric operations, succeeds Mr. Doebler as operating vice president.

DONALD P. SHAFER has joined General Controls Co., Glendale, Calif., as manager of the company's Columbus, Ohio branch office. He will be in charge of sales, engineering, and service on the company's line of automatic controls throughout the Columbus area.

JOSEPH A. REYNOLDS, formerly assistant manager, has been named manager of the personnel department of Brooklyn Union Gas Co.

Newly appointed division manager in Philadelphia for the Gustin-Bacon Manufacturing Co., Kansas City, Mo., is BARTH GILCRIST, formerly of the eastern division. LEONARD E. FEITT, resident salesman in Pittsburgh, will be assistant to Mr. Gilcrist.

E. P. ROUDEBUSH has been promoted to vice president and works manager of the Roots-Connersville Blower Div., Dresser Industries Inc. He will be in charge of all manufacturing activities at the Connersville, Ind. and Delaware, Ohio plants. The company has also announced that D. A. JOHANN has been promoted to vice president in charge of sales.

E. P. Roudebush

D. A. Johann

D. P. Shafer
General Controls

J. F. Robinson
AGE

J. FRENCH ROBINSON, president of Consolidated Natural Gas Co. of New York and chairman of the board of East Ohio Gas Co., has been appointed to the board of directors of Affiliated Gas Equipment Inc., Cleveland.

Iron Fireman Corp., Cleveland, has announced the promotions of S. H. BEACH to the newly created position of industrial sales manager, and D. PAUL BAILEY to assistant sales manager. Mr. Bailey will continue to supervise market research for the company.

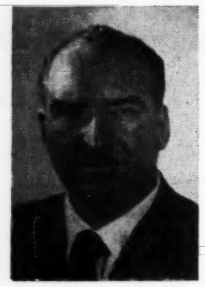
With the retirement of ROBERT W. WARD from American Car & Foundry Co., New York, JAMES M. WHITE has been elected to succeed him as vice president in charge of manufacturing. Mr. Ward has had 42 years of service with ACF.

Only one in a million sheepskins is good enough for Lancaster gas meter diaphragms. Finest quality lambskin is used exclusively—skillfully tanned by the expensive chrome process. Uniformly soft and pliable, the leather in Lancaster diaphragms will hold its shape and flex millions of times without breaking. No wonder Lancaster Metal Rim Diaphragms stay in the meter for so many years.

Skins from small, young New Zealand sheep best meet our needs. After chrome tanning, the fine fibers between inner and outer layer of the leather are still springy and "alive".

METER PARTS CO.

M. J. Harper



H. Gottwald

The meter and valve division of Rockwell Manufacturing Co. has announced the appointment of M. J. HARPER as vice president and H. GOTTWALD as eastern regional manager of sales and district manager of the New York district office. Until this appointment Mr. Harper, with Rockwell for more than 30 years, was eastern regional manager. For the past two years Mr. Gottwald has been general manager for the Nordstrom valve division. It has also been announced that COL. W. F. ROCKWELL, Rockwell chairman, has been named a key aide in reorganization of the Mutual Security Program.

G. M. WALLACE, manager of Bailey Meter Co.'s Denver district, has been named assistant sales manager of the company with headquarters in Cleveland.

REYNOLDS HIGH PRESSURE LINE REGULATORS in parallel hookup have an increased range of capacity as well as a wider range of delivery pressure control. This also provides greater margin for emergencies. On inlet pressure the range is up to 650 pounds. For outlet pressure, this unit assures absolutely accurate and dependable control from 2 to 100 pounds. This variance in outlet pressure is made by use of different sizes of diaphram cases and further flexibility in the spring type is possible by use of different strength springs.

BRANCH OFFICES

H. D. "MIKE" MEUFFELS
423 Dwight Building
Kansas City, Missouri

SEIDENGLANZ & CO.
2nd Unit, Santa Fe Building
Dallas, Texas

REPRESENTATIVES

EASTERN APPLIANCE COMPANY
Boston, Massachusetts

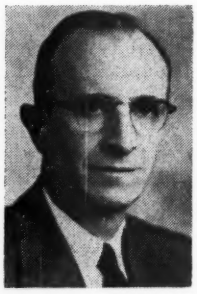
WALDO S. HULL
163 W. Queen Lane
Philadelphia, Pennsylvania

Reynolds Gas Regulator Co.
ANDERSON, INDIANA, U. S. A.

GAS CONTROL SINCE 1892

Transfers

W. W. SELZER has been promoted to the position of assistant business promotion manager of the Columbia Gas System Service Corp., New York. As a result of this promotion, PAUL D. MILLER, who has been business promotion manager in Ohio Fuel's Zanesville district, becomes dealer sales manager in Columbus. Ohio Fuel has also announced the appointment of MRS. ALICE SMITH as home service adviser "Betty Newton" in Coshocton.



Paul Miller

W. W. Selzer

JAMES R. MCCUTCHEON JR. has been appointed sales manager of the valve division of Homestead Valve Manufacturing Co. with headquarters in Coraopolis, Pa. For the past seven years he has been with American Car & Foundry Co.

M. W. GAYLORD has been named assistant manager of the research administration section of the research department of Koppers Co. Inc. Former production manager of Koppers' gas and coke division, Mr. Gaylord will headquarter at the Verona, Pa., research center.

D. CLINTON GROVE, formerly with the Blaw-Knox Co., has joined Reuter & Bragdon Inc., public relations firm. He will assist in servicing clients on matters pertaining to management-sponsored information.

New faces

CALVIN H. YUILL, an authority in building materials research, has been named director of the fire technology division of the Southwest Research Institute, San Antonio, Texas. He succeeds NORMAN C. PENFOLD who has become associate director and assistant to the president of the institute.

DON T. MCKONE, attorney of Jackson, Mich., has been elected a member of the board of directors of the Consumers Power Co., Jackson.

A. SIDNEY HORTON has been elected a director of Consolidated Gas Electric Light & Power Co., Baltimore, succeeding FRANCIS J. RUE, who has resigned.

Several new appointments have been made by the National Research Corp., Cambridge, Mass. DR. GEORGE A. SOFAR has

been named project manager in the applied physics department; DR. MILO P. HNILICKA JR. has joined the chemistry department; and KENNETH G. DONALD has become vice president and treasurer, succeeding E. NORMAN STAUB, who has resigned.

COL. HENRY E. WOOLDRIDGE, formerly vice president of the United Transportation Equipment Co., has been appointed direct factory representative for the J. H. Holan Corp., Cleveland. With headquarters in San Mateo, Calif., he will supervise sales in California, Nevada, Arizona, Utah, and the Hawaiian Islands.

T. L. Pantz
Servel

H. E. Wooldridge
Holan

THEODORE L. PANTZ has been named vice president in charge of manufacturing at Servel Inc., Evansville, Ind. He was formerly works manager of the Seeger Refrigerator Co.'s Evansville plant.

Kraloy Plastic Pipe Co. Inc., Los Angeles, has appointed E. J. HALL to the post of western sales representative to service gas and water utilities and industrial firms.

WILLIAM C. HENDERSON has become sales representative in the Los Angeles office of Allis-Chalmers Manufacturing Co., Milwaukee.

Honors

JAMES LORING RICHARDS, chairman of the board of directors of Boston (Mass.) Consolidated Gas Co., was honored recently on the occasion of his 95th birthday. He served Boston Consolidated as president from 1903 to 1917, when he became chairman of the board.

Winners in Tappan Stove Co.'s annual "top ten" national sales contest have been announced. JACK BLAND, San Antonio, garnered the highest percentage of quota in the four-year history of the contest to take first place among sales representatives in 1952. R. J. SWALLEN, Houston, was top district manager as all five men in his district placed among the top seven representatives in the contest standings.

Deaths

LOUIS K. DOUTRICK, retired vice president of Arizona Public Service Co., Phoenix, died Jan. 28 following a lengthy illness. A member of the gas industry for 31 years, he was elected to the company's board of directors in 1948 and became vice president and general consultant in 1950. He remained a member of the board until the time of his death.

THOMAS F. SMITH, retired vice president of Boston (Mass.) Consolidated Gas Co., died Feb. 3. Mr. Smith joined Boston Consolidated in 1919 and from the post of clerk in the distribution department he rose to superintendent of the department, assistant vice president, and then vice president in 1942, serving there until his retirement in 1949.

GERALD ELDRIDGE STEDMAN, publisher of Private Executive Report, Kiplinger-style news letter for the gas and electric utility industries, died Jan. 21. Mr. Stedman was well known as a writer for gas industry trade journals for a number of years.

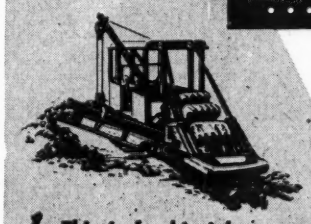
LEON LOUIS SMITH, 58, superintendent of gas distribution of the Oswego-Fulton area of the Niagara Mohawk Power Corp., died in January.

HENRY T. HAMILTON, 82, secretary-treasurer of the Carnegie Natural Gas Co., Pittsburgh, Pa., before his retirement, died in St. Petersburg, Fla., late in January.

It takes a FULL team

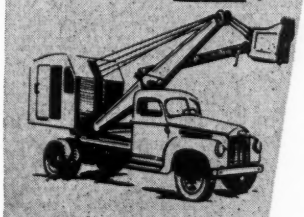
. . . whether it's surgery

. . . or digging equipment



1. This is for big jobs

2. This is for medium jobs



3. Sherman for all other jobs

On many excavating jobs the use of big equipment is costly and time-consuming. The Sherman Power Digger is designed so that you get all the advantages of power digging on these jobs. Thousands of users have proved that the Sherman Power Digger reduces costs. Write today for descriptive literature J6.

Designed, Engineered and Manufactured Jointly by
SHERMAN PRODUCTS, Inc.
Royal Oak, Michigan
WAIN-ROY CORPORATION
Hubbardston, Mass.

•

Patent No. 2,303,825
Other patents pending

Sherman
PRODUCTS, INC.
ROYAL OAK, MICHIGAN
Sherman SP Products

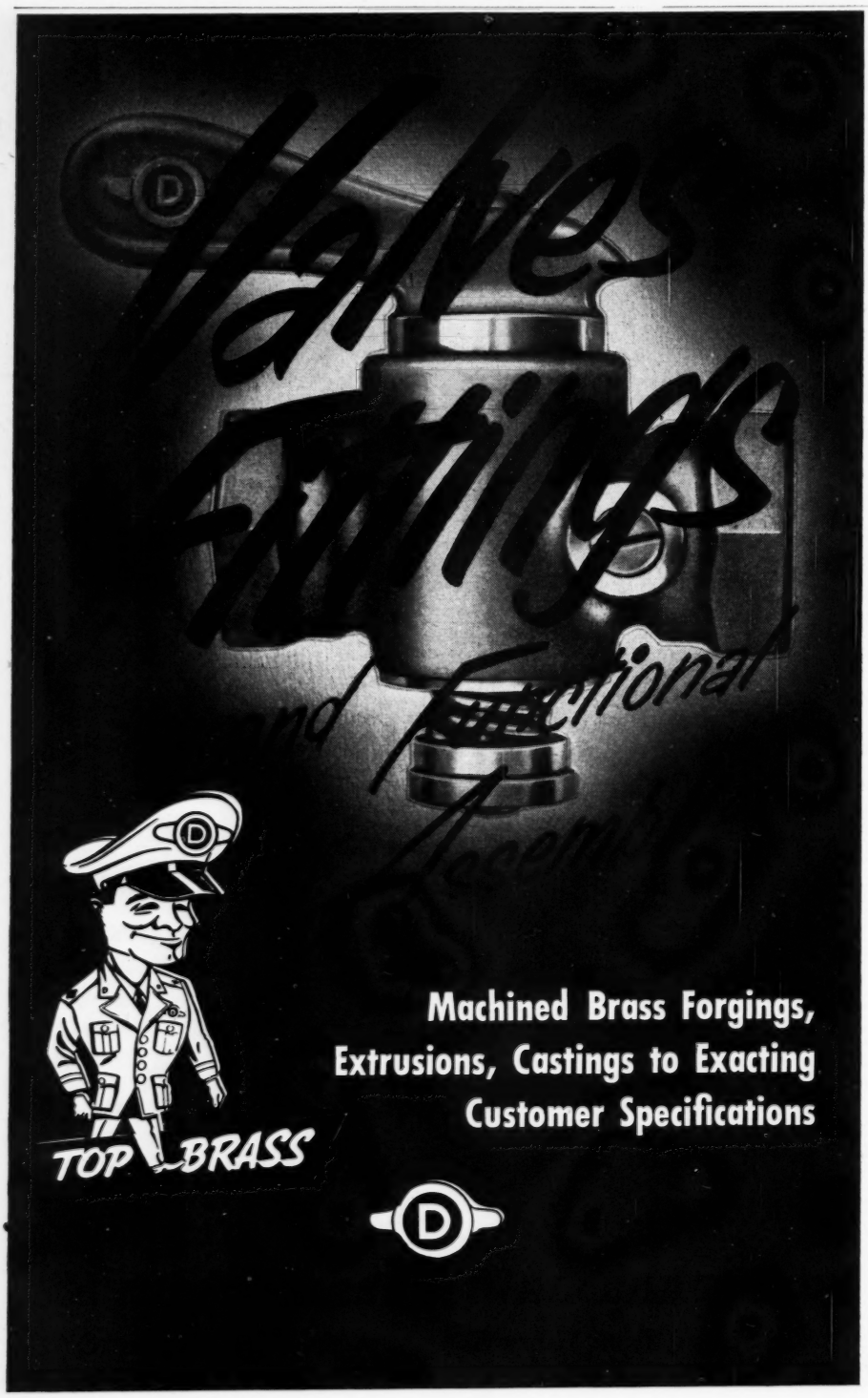
ASSOCIATIONS

Home service heads discuss new demonstration methods

More than 210 people attended the AGA Home Service Workshop in Dallas early last month to hear talks on demonstration methods, sales, and dealer activities and to attend panel discussions on small group demonstrations, home calls, service girl training, home service programs with dealers, school programs, and dryer calls. The three-day affair was sponsored by the home service committee of the AGA's residential gas section in cooperation with the Southern Gas Assn.

Among the papers presented were two success stories on new innovations in home service departments. The "Three-Way Profit Program" of the Minneapolis Gas Co. was described by Mildred Endner as a church-dealer-gas company cooking school benefiting all three participants by introducing a large group to the dealer, by letting the gas company tell its story on gas and gas appliances to the same large group, and, of course, by paying off financially for the church through concentrated effort on a large group activity.

Helen Mandigo of the Gas Service Co., Kansas City, Mo., reported on her company's "Breakfasts for Dealers," a streamlined demonstration put on from 8 to 9 a.m. The dealer salesmen are given a large breakfast and watch preparation of a completely cooked broiler meal, another prepared on the range top, and an oven operation demonstration.



AGA convention committee headed by Robert W. Otto

Robert W. Otto, president of Laclede Gas Co., St. Louis, has been appointed chairman of the general convention committee for the 35th annual AGA convention scheduled for Oct. 26-28 in St. Louis.

The Kiel auditorium will serve as association headquarters, and convention registration and as many of the meetings as possible will be held there. To provide opportunities for members of like interests to be together, the Statler hotel has been assigned as headquarters of the accounting section; Jefferson hotel for residential gas and industrial and commercial sections; and Lennox and Mayfair hotels for operating section. Hotel reservations will be handled through a housing bureau operating under the general convention committee.

Other men appointed to the convention committee are Eskil K. Bjork, Lyle C. Harvey, J. T. Innis, F. A. Lydecker, James S. Moulton, Arthur Stockstrom, Henry Tuttle, John A. Weiser, A. H. Weyland, and J. Theodore Wolfe. Kurwin R. Boyes, AGA secretary, will serve as secretary of the committee and convention manager.

Industrial and commercial sales conference arranged

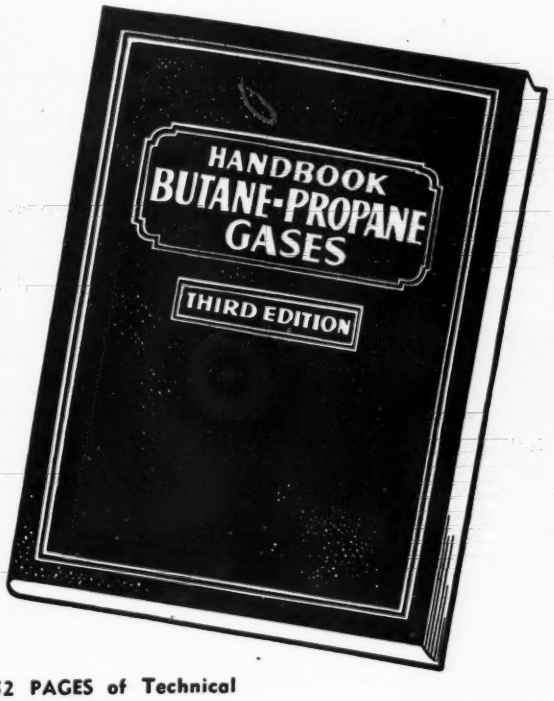
The 1953 AGA sales conference on industrial and commercial gas is scheduled for the Hotel Warwick, Philadelphia, April 13-15 with representatives from the sales and utilization branches of the industry meeting to hear experts in selling gas, prominent industrialists, and gas industry leaders.

Topics to be discussed through talks and panel discussions include heat application to fry kettles, heavy duty cooking equipment, automatic lighting, commercial processing, industrial and commercial gas advertising and publicity, commercial gas sales campaigns, drying processes in food and industrial products, and heat applications in the chemical industry and the glass industry.

Clinic to highlight AGA utilization conference

A clinic on "What I Would Like to See in Gas Appliances and Service" will highlight the eighth annual AGA research and

The Only Complete Reference Book on Liquefied Gas Engineering, Installation and Operation



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Properties of Butane-Propane Mixtures
Volume Correction Factors
Analytical Determination and Testing
Natural Gasoline Plants, Recycling Plants, Oil Refineries
Delivery by Truck, Rail, Water, Pipe Lines
Storage Tank and Pressure Vessel Design
Liquid Metering and Pumping Systems
Installing and Servicing LP-Gas Systems
Semi-Bulk Systems
Bottled Gas Systems
Gas Utility Service from Central Plants
Multiple Utility Service from a Central Plant
Comparative Performance with Other Fuels
Appliance Installation and Testing
Domestic Applications
Commercial Applications
Industrial Applications
Enrichment, Peak Load and Standby Uses
Fuel for Internal Combustion Engines
N.B.F.U. Pamphlet No. 58 (1947)
Motor Carrier Regulations
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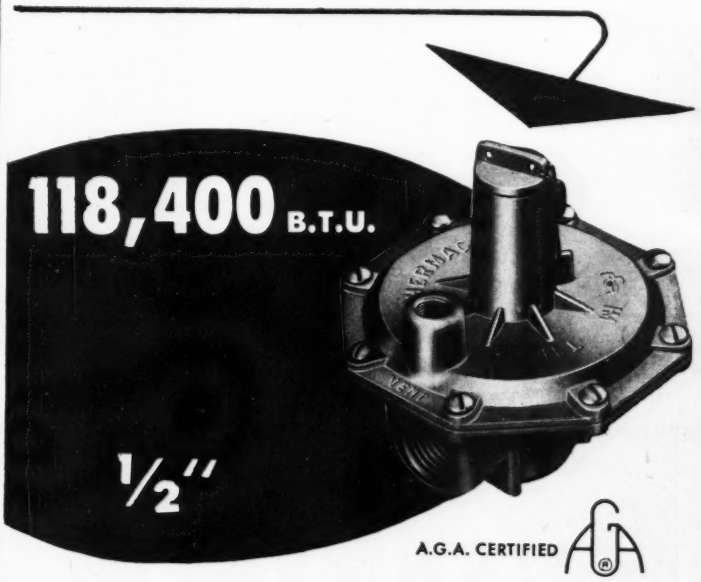

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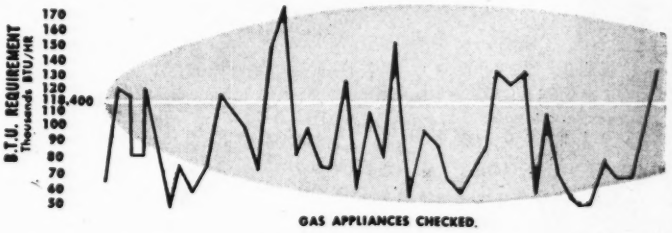

The octagonal shape makes installations in tight spots a cinch. We have also added vise grip bosses to aid assembly. Then too, the cover vent may be tapped to receive your particular connection thereby eliminating need for extra fittings. In the new "T" series you have a small regulator with more capacity at a lower price plus a lower installed cost. Send today for new illustrated literature.

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utilization conference to be held April 7-8 in the Hotel Statler, Cleveland.

Panel sessions on cooking, water heating, heating and air conditioning, and general utilization in addition to technical and non-technical papers on research projects and utilization problems will also be a part of the meeting. Other subjects to be discussed include galvanized water heater tank corrosion, venting principles, new requirements, burner research, and kitchen soiling.

The conference is sponsored by the committee on domestic gas research and the AGA utilization bureau. Conference committee chairman is Henry A. Eddins, vice president of Laclede Gas Co., St. Louis.

A study of secondary aeration, venting, and position of thermostatic control in experimental ovens, one of the many research projects being conducted by the AGA Laboratories. Latest findings of this and other research will be discussed extensively at the AGA Research and Utilization conference to be held in Cleveland on April 7-8.

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Conference and exhibition planned by corrosion men

Technical papers in nine symposia, four discussion sessions, three educational lectures on the principles of corrosion and numerous other technical and social events have been scheduled for the March 16-20 conference and exhibition of the National Assn. of Corrosion Engineers in Chicago.

The sessions will include roundtable discussions of general pipeline problems and pipeline coatings, a symposium on cathodic protection, and a number of pipeline group discussions. Symposia are scheduled to cover corrosion principles, corrosion by fresh and salt water, refinery industry, elevated temperature, power and communication industry, oil and gas production, cathodic protection, chemical industry, and protective coatings.

New 1953-54 officers are Walter F. Rogers, Gulf Oil Corp., president, and Aaron Wachter, Shell Development Co., vice president. Russell A. Brannon, Humble Pipe Line Co., has been re-elected treasurer.

Speakers announced for Mid-West Gas convention

The program to be presented at the 48th annual convention of the Mid-West Gas Assn., scheduled for March 30-April 1 at the Broadmoor hotel in Colorado Springs, has been announced.

Speakers and their subjects include Frank Henke, Harper-Wyman Co., "Gas vs. Electricity"; J. J. Hedrick, Natural Gas Pipeline Co. of America, "Underground Storage of Natural Gas"; Alfred L. Dowden, Liberty Mutual Insurance Co., "Public Safety and the Gas Industry"; Miss Julia Hunter, Lone Star Gas Co., on home service; L. E. Clancy, Detroit-Michigan Stove Co., commercial gas appliances; Gaylor B. Buck, Public Service

Co. of Colorado, merchandising gas appliances; Ernie Olson, K. K. Co., "Gas Incinerators, Sales and Service"; M. A. Ennis, National Committee for L. P. Gas Promotion, "Employee Training."

Also on the program will be AGA President Frank C. Smith, GAMA President James F. Donnelly, and Robert W. Hendee, Colorado Interstate Gas Co.

Committees transferred to general management group

The AGA has transferred jurisdiction over 11 committees to the recently authorized general management section.

The committees include accident prevention, comparison of competitive services, corporate secretaries, economics, gas home study courses of IGT, insurance, natural gas supply men's fund, personnel, public information, rate, and the special committee to advise with the Bureau of Labor Statistics.

The new section will be activated when 200 members have filed applications for membership.

Association notes

New members of the AGA public information committee are Earle A. Clark, director of public relations, Northern Natural Gas Co., Omaha, and Schuyler F. Baldwin, director of public relations, Rochester (N. Y.) Gas & Electric Corp. Howard A. Praeger, manager of publicity and advertising for Brooklyn Union Gas Co., has rejoined the committee after a tour of duty in the army.

Reg F. Taylor, consulting engineer of Houston, has been elected president of the American Society of Heating & Ventilating Engineers for 1953, succeeding Ernest Szekely. Other new officers include L. N. Hunter, National Radiator Co., 1st vice president; John E. Haines, Minneapolis-Honeywell Regulator Co., 2nd vice president; John W. James, McDonnell & Miller Inc., treasurer.

Howard S. Rose, president of United Natural Gas Co., Oil City, Pa., has been elected president of the Pennsylvania Natural Gas Men's Assn. R. L. Ehrman was elected vice president; P. L. Kesel, secretary-treasurer; and George Doying, executive secretary. Fenton H. Finn was added to the board of directors.

Safety experts and accident prevention personnel from more than 20 states will meet in New York March 24-27 for the 23rd annual safety convention and exposition. Ten thousand are expected to attend the convention, co-sponsored by 73 agencies and the Greater New York Safety Council. Displays of safety equipment, driver testing devices, accident reduction systems, eye conservation tests, and other displays will make this the largest exposition in the group's history.

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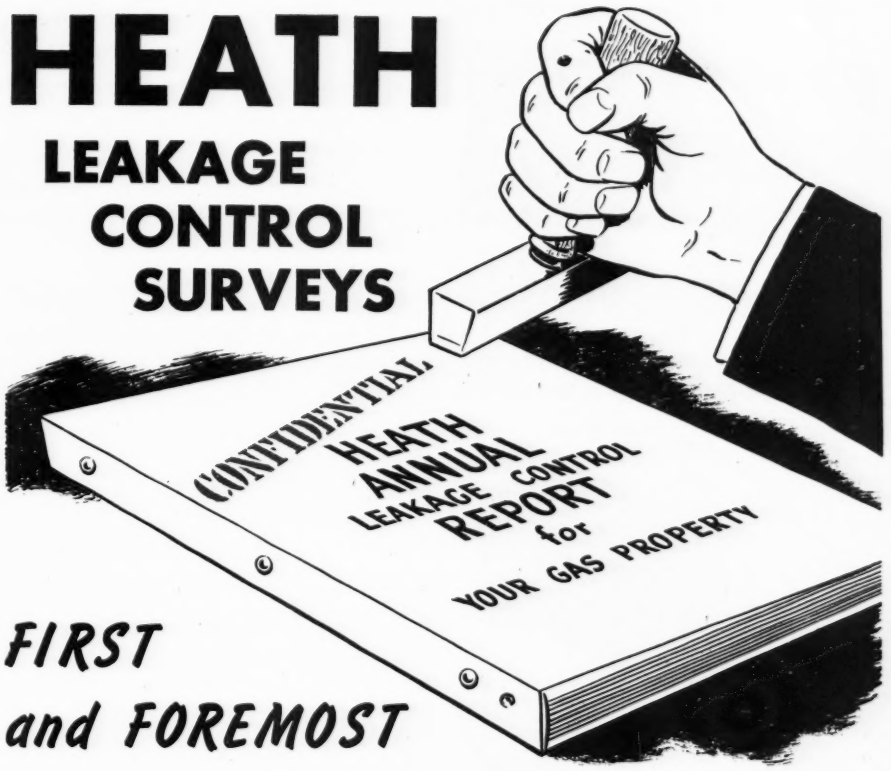

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CALENDAR

March

2-6..American Society for Testing Materials Spring Meeting — Statler hotel, Detroit.

16-20..National Association of Corrosion Engineers — Hotel Sherman, Chicago.

18-19..PCGA Technical Section, Joint Conference, Customers Service and Accident Prevention—Fresno, Calif.

24..Greater New York Safety Conference — Hotel Statler, New York.

24-25..PCGA Sales Section, Commercial and Industrial Sales Conference—Los Angeles.

26-27..Oklahoma Utilities Assn. Annual Convention — Tulsa hotel, Tulsa.

26-27..New England Gas Assn. Annual Meeting—Hotel Statler, Boston.

30- 1..Midwest Gas Assn. Annual Convention—Broadmoor hotel, Colorado Springs.

April

7-8..AGA Research and Utilization Conference — Hotel Statler, Cleveland.

8-9..PCGA Accounting Section — Phoenix.

13-15..AGA Sales Conference on Industrial and Commercial Gas —Hotel Warwick, Philadelphia.

13-15..AGA Accounting Section, Purchasing and Stores Conference — Shroeder hotel, Milwaukee.

13-16..AGA Distribution, Motor Vehicles and Corrosion Conference—Hotel Sherman, Chicago.

15-16..PCGA Sales Section, Home Service Workshop — Santa Barbara, Calif.

16-18..Florida-Georgia Gas Assn.— Hotel Biltmore, Palm Beach, Fla.

20-22..National Conference of Electric & Gas Utility Accountants—Hotel Sherman, Chicago.

21-23..AGA Subcommittee No. 8 on Gas Transmission & Distribution Piping—Santa Monica, Calif.

21-23..Southwestern Gas Measurement Short Course—University of Oklahoma, Norman.

23-24..Indiana Gas Assn. Annual Convention — French Lick Springs hotel, French Lick, Ind. (Tentative).

27-29..Mid-West Regional Gas Sales Conference — Edgewater Beach hotel, Chicago.

28-29..PCGA Technical Section, Distribution — San Jose, Calif.

29- 1..Natural Gasoline Assn. of America Annual Convention —Rice hotel, Houston.

30- 1..AGA Transmission and Storage Conference—Edgewater Beach hotel, Chicago.

May

1..New England Hotel & Restaurant Show—Statler Hotel, Boston.

4-5..AGA Eastern Natural Gas Regional Sales Conference — William Penn hotel, Pittsburgh.

4-6..LPGA Annual Convention— Conrad Hilton hotel, Chicago.

4-8..AGA Industrial Gas School— Sheraton-Cadillac hotel, Detroit.

5-6..Gas Hydrate Control Conference—University of Oklahoma, Norman.

11-13..Southern Gas Assn. — Jung hotel, New Orleans.

11-15..National Fire Protection Assn. — Edgewater Beach hotel, Chicago.

11-15..34th Annual National Restaurant Convention & Exposition—Navy Pier, Chicago.

12-14..Pennsylvania Gas Assn. Convention.

14-23..International Petroleum Exposition — Tulsa.

20-22..GAMA Annual Meeting — The Greenbrier Hotel, White Sulphur Springs, W. Va.

25-27..AGA Production and Chemical Conference—Hotel New Yorker, New York City.

27-29..Short Course in Gas Technology—Texas College of Arts & Industries, Kingsville.

28-29..Natural Gas & Petroleum Assn. of Canada — London, Ont., Canada.

June

14-18..Canadian Gas Assn.—Windsor hotel, Montreal.

22-23..Michigan Gas Assn.—Grand hotel, Mackinac Island, Mich.

September

9-11..Pacific Coast Gas Assn. Annual Convention—San Francisco.

10-11..Midwest Gas School and Conference — Iowa State College, Ames.

11..New Jersey Gas Assn. — Spring Lake, N. J.

October

26-28..AGA Annual Convention — Kiel Auditorium, St. Louis, Mo.

NEWS

Southern Natural plans to distribute Alabama stock

Southern Natural Gas Co., Birmingham, has requested the Securities & Exchange Commission to approve a plan providing for the pro rata distribution to Southern's stockholders of the common stock of Alabama Gas Corp., also of Birmingham, now owned by Southern. At present, the parent company has approximately 99% of Alabama Gas stock.

If the plan is approved, Alabama Gas would no longer be a subsidiary of Southern Natural and would not be subject to regulation under the Public Utility Holding Company Act. And, with the stock distribution to be subject to Supplement R of the income tax laws, Southern Natural would also cease to be subject to regulation under the act at completion of the distribution.

The plan contemplates that principal operating officers of Alabama Gas will continue in office but that the officers and directors of Southern Natural would resign as officers and directors of Alabama Gas.

Dual burner introduced at engineering conference

A feature of the two-day engineering and sales conference conducted by Webster Engineering Co. in Tulsa recently was the introduction of the Rotonetic, a new dual fuel burner developed by Webster for firing large heating or industrial boilers using either low pressure gas or any grade of fuel oil. The new unit will be manufactured in six sizes ranging in capacity from 75 to 300 boiler hp.

L. S. Reagan, vice president and general manager of the Tulsa concern, conducted the meeting and Frank H. Adams, president of Webster and of Surface Combustion Corp., Toledo, addressed the opening session.

Ease of changing from one fuel to the other with the new Rotonetic is demonstrated by Mrs. Bettye Riggs, Webster secretary, while company officials watch.

Electric industry breaks gas-consumption record

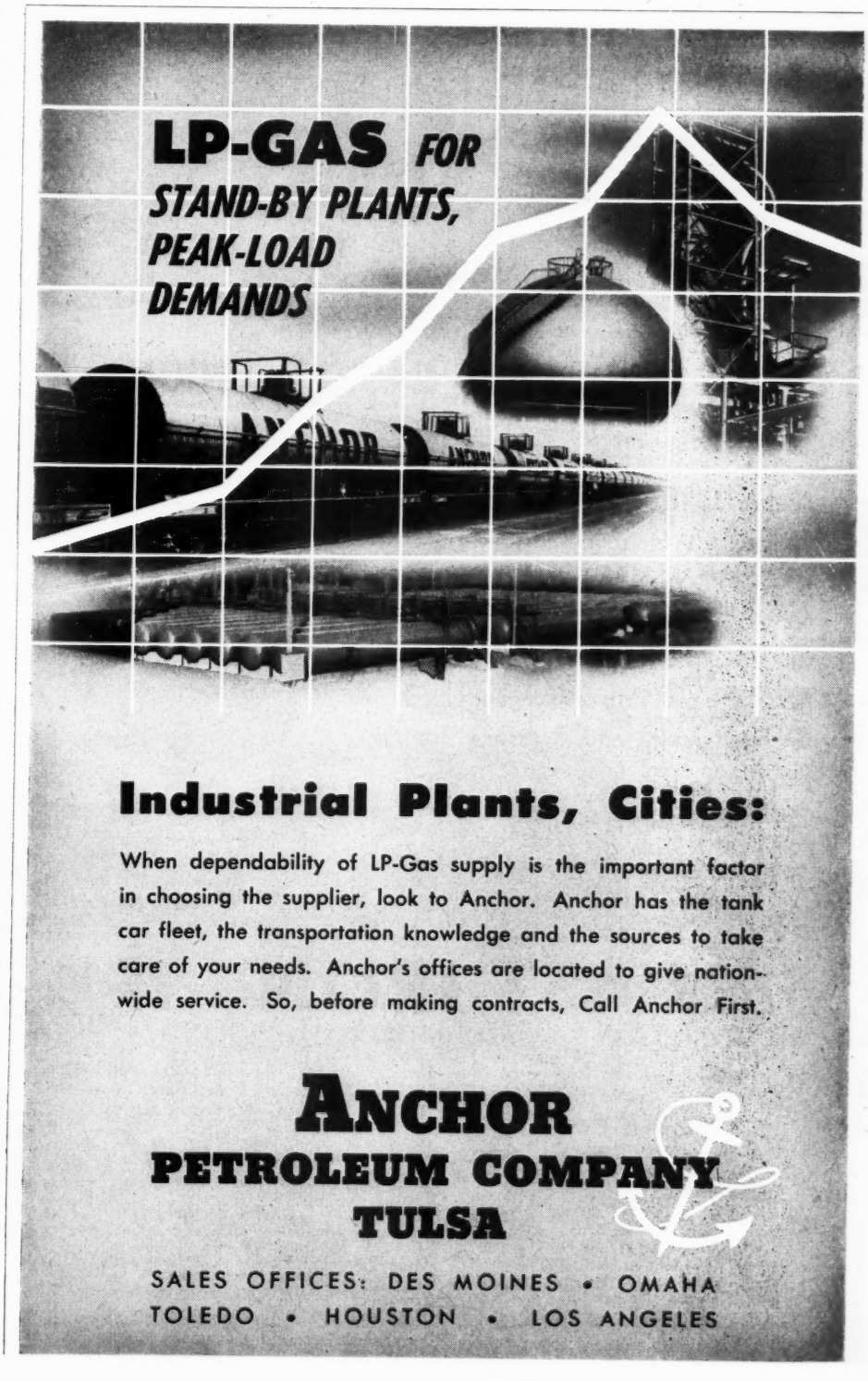
A record amount of gas was consumed by electric utility power plants during 1952, according to the February report of the FPC on "Consumption of Fuel for Production of Electric Energy." More than 911 billion cu ft was consumed, a 19.4% increase over the previous record year of 1951 when the total reached more than 763 billion.

In December, the use of gas amounted to 60,538,362,000 cu ft, a gain of 15.5% over December 1951. However, the December 1952 usage was 13.4% below November, when 69,943,161,000 cu ft was burned.

Rasch Manufacturing Corp. acquires Security assets

Rasch Manufacturing Corp. has purchased certain assets and the "Security" trademark of the Security Manufacturing Div. of the Kemper Investment Co. From its plant location in Kansas City, Mo., Rasch will produce and sell water heaters, conversion burners, furnaces, floor furnaces, and other appliances.

At the first directors meeting the following officers were elected: William T. Rasch, formerly president of the Security Manufacturing Co., was named president of the new corporation; Lee W. Rasch, formerly vice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president of Security, was named vice president and treasurer; and Fred Bellemere Sr. was named secretary and general counsel. Berl Berry, Morris S. Fogel, Harry D. Rice, and Lewis A. Mears were appointed directors.

Peoples Natural schedules gas mask training classes

Familiarity with wearing a gas mask while repairing difficult gas leaks is the goal of a series of classes scheduled by the Peoples Natural Gas Co., Pittsburgh, for all field district and divisional service area personnel. The classes are a part of the system-wide familiarization program of Peoples Natural.

The Mine Safety Appliance combination hose mask will be used in the classes and will then be distributed for subsequent use in divisional service areas.

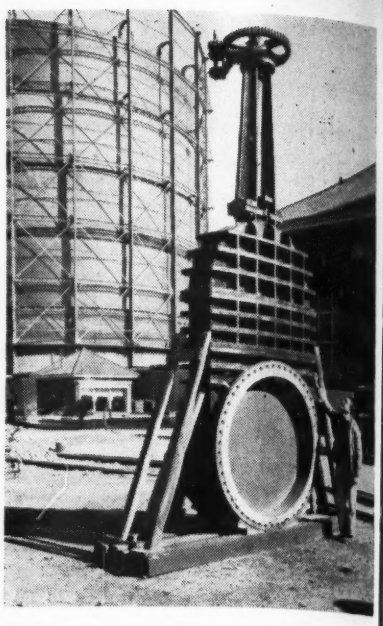
Harrison gas plant expands plant piping system

One of the major projects in the recent extensive expansion of the piping system at the Harrison plant of Public Service Electric & Gas Co. of New Jersey was the installation of a new 60-in. cast iron supply header to increase the gas flow from the storage holders to the distribution pumping equipment.

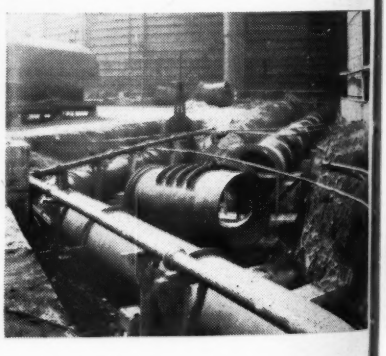
This is the first installation by Public Service of cast iron pipe and valves of this size. The 60-in. motor-operated gate valve is over 20 ft high and weighs 10 tons. The installation of this header and connections will expand the gas supply to the Harrison compressors from about 7 to 12 MMcf per hour with all holders in service.

The fact that over 1.2 million lbs of cast iron pipe, fittings, and valves were used in this project gives some idea of its proportions. Unstable soil conditions in the area made it necessary to use steel pipe piles to support this heavy piping load and approximately 400 of these piles were filled with concrete and driven to a depth of 30 ft.

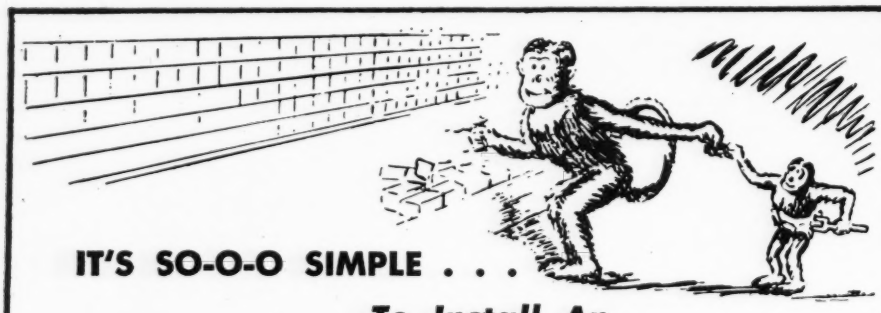
The extensive additions and alterations to the plant piping system were needed to provide for the rapid growth in the demand for gas from the plant. The peak day demand



The mammoth 60-in. motor-operated gate valve prior to installation. The valve is over 20 ft high and weighs 10 tons.



The new 60-in. cast iron main under construction at the Harrison (N. J.) gas plant. The main will transport gas from the 15-MMcf holder in the background to the compressor supply header. In the foreground is the old 42-in. supply main that the new line supplements.



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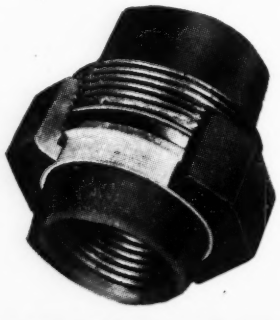

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Portland 4, Oregon, 501 Portland Trust Bldg. Phone: Atwater 2815.
Salt Lake City, Waterworks Equipment Co. Phone: 4-1971.
Seattle, Wash., Smith Tower Bldg. Phone: Seneca 2680.

has more than doubled in the past five years and continues to increase at an accelerating rate.

Included also in the current expansion program is the addition of a 3-MMcf per hour turbine-driven gas compressor to supplement the four existing units, each of which has one-half the capacity of the new unit. The new 60-in. header will augment the supply to all five pumping units. The compressor building has been enlarged to accommodate the new compressor as well as another of the same type planned for the future. The major portion of these new facilities was in service by the first of the year.

Courtesy *Public Service News.*

Water heaters and ranges featured in AGA campaigns

Two big sales campaigns, one under way and the other scheduled for next month, are among the AGA's current promotion activities.

The automatic gas water heater campaign (February-April) has more than twice as many participants as any previous water heater promotion, including a record number of gas utilities. Tying together the entire nationwide promotion is a PAR-financed drive including advertising in national magazines, decorative kits, and sales aids for dealers.

Getting under way next month and running through June will be the Carnival of Gas Cooking, supplanting the two-year-old Spring Style Show. Featuring the gas industry's 1953 theme "Only Gas Gives You ——," the campaign will use glamour and drama to sell automatic gas ranges. Sales messages will appear in national magazines with a combined total circulation of more than 20 million readers.

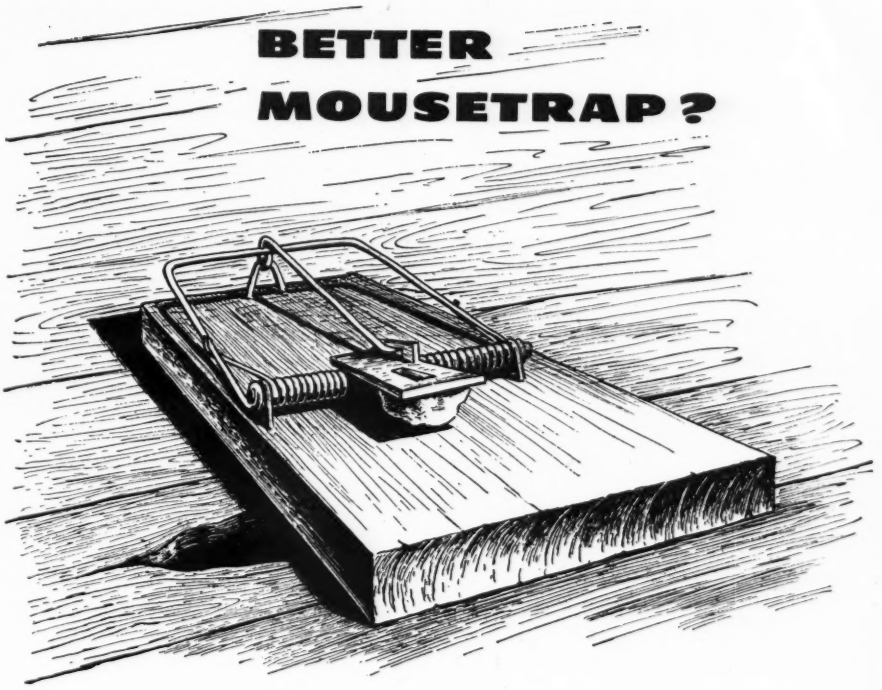
Calcinator Corp. formed to produce disposal units

Until early this year a division of the Valley Welding & Boiler Co., the Calcinator Corp., Bay City, Mich., has been formed with John W. Hebert as president. The firm will continue to produce Calcinator garbage disposal units.

As a part of its expanded program for 1953, Calcinator has announced two major appointments to its staff. George H. Kennedy has become assistant to Willard M. Milbourne, sales manager, and Hardy B. Payor has been named director of marketing. The company has as its 1953 goal the production of at least 60,000 Calcinator units.

GAMA predicts gas heat for 70% of new homes

Seven out of 10 new houses built in 1953 will be gas-heated in areas where gas is available, according to Edward A. Norman Jr.,



The story of the reward for a better mousetrap is proverbial. But the fact remains that most mice are still caught by this simple, economical and effective contraption.

Gas purification is a parallel case.

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Standing in front of the new plant of the Chaplin-Fulton Manufacturing Co., Pittsburgh, is the group that attended a recent all-day forum on pressure regulations, safety, and control problems conducted by Chaplin-Fulton and the Equitable Gas Co.

chairman of the heating division of GAMA.

He also predicted that more new houses will be built in 1953 than in any year since the war, with the possible exception of 1950, and that a record will be set for the percentage of new homes heated by gas. He based his predictions on indications that the emphasis would be on homes selling for under $12,000 and the fact that gas requires no storage facilities, a factor to be considered in small home construction.

News Notes

In a joint application filed with the FPC, the Washington (D. C.) Gas Light Co. and its wholly owned subsidiary, Prince George's Gas Corp. of Chillum, Md., have requested a certificate authorizing the parent company to acquire and operate the facilities and properties of Prince George's Gas.

Twenty recent graduates in mechanical and industrial engineering are attending a basic heating engineering training program conducted by the National Radiator Co. in its Johnstown, Pa., general offices. The four-week program got under way Feb. 16 and on March 18 diplomas certifying the completion of the course will be presented.

A bill to enable Missouri gas companies to acquire property for underground storage of gas by condemnation was introduced in the Missouri Senate recently. The bill would primarily benefit Laclede Gas Co. since that company is currently planning a large underground storage project.

Servel Inc., Evansville, Ind., has appointed Snook & Aderton Inc., Lubbock, Texas, distributors of Servel air conditioning for the South Plains area of west Texas.

As a part of its long-range expansion program, Affiliated Gas Equipment Inc., Cleveland, has purchased the Toronto (Canada) Hardware Manufacturing Co. Ltd. The Toronto firm manufactures and sells automatic water heaters, range boilers, and cast iron soil pipe and fittings.

FPC has announced the issuance of Vol. 9 of the Federal Power Commission Reports which contains opinions and decisions for the calendar year 1950. The volume includes all formal opinions issued by the commission in 1950, intermediate decisions that have become final, and an appendix of selected orders in the nature of opinions. Priced at $4, the book may be obtained from the FPC Publications Division, Washington 25, D. C.

The second edition of the commercial standard "Gas Furnaces, Gravity Circulating Type" (Commercial Standard CS99-52) is now available, according to the Commodity Standards Div., U. S. Department of Commerce. The purpose of the standard is to establish minimum specifications for these furnaces as a guide to manufacturers, distributors, and users. Copies may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for five cents per copy.

Current Reading

ADDITIVES — This pocket-size booklet describes new and late developments in the field of additives used in industrial and automotive oils and greases.

It offers an elementary explanation of the problems that are solved or relieved by use of additives; the action of additives; several test engines used to evaluate the merits of additives; procedure of the "L" series and other tests used to evaluate additive type oils; and the API service classification and designations for automotive type engine oils.

The 80-page, paper-bound booklet has 110 illustrations. It is available from the Petroleum Educational Institute, 9020 Melrose Ave., Los Angeles. Price, $1.50.

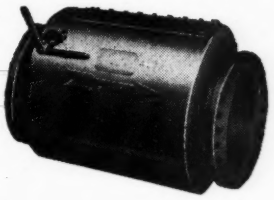
COMPRESSED AIR POWER IN INDUSTRIAL PRODUCTION — This pamphlet, containing 63 illustrations, is the third in a series of engineering studies in the Compressed Air & Gas Institute's educational program. The booklet discusses pneumatic tools and aids to production so that designers, engineers and production men may be better able to evaluate the usefulness of pneumatic equipment. In so doing, they will be in a better position to design and/or install production equipment which will result in the most economical operations utilizing compressed air power.

The 36-page pamphlet presents many uses of compressed air in industrial production. It is available at 25 cents per copy from the institute at 1410 Terminal Tower, Cleveland, Ohio.

UNDERGROUND STORAGE OF NATURAL GAS IN COAL-MINING AREAS — Prepared by Henry P. Wheeler Jr. and William E. Eckard, this Bureau of Mines report describes underground gas storage in the Appalachian area, where more than two-thirds of all the fields in the U. S. used for storing natural gas underground are located.

Pointing out the need for storage of natural gas near points of consumption, the report discusses the hazards of gas leakage from storage fields in coal mining areas and describes the factors involved in selecting and developing storage fields. A free copy of the report, Information Circular 7654, is available from the Publications Distribution Section, Bureau of Mines, 4800 Forbes St., Pittsburgh 13, Pa.

ECONOMICS OF NATURAL GAS IN TEXAS — Prepared by John R. Stockton, Richard C. Henshaw Jr., and Richard W. Graves, of the Bureau of Business Research, University of Texas, this comprehensive discussion of natural gas economics, although emphasizing the place of Texas natural gas in the overall national picture, should prove interesting to persons concerned with any phase of the economic problems of energy sources in the world. Much information about oil, coal, water power, and atomic



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IPE displays will include many exhibits of interest to gasmen

Many types of plastic pipe, new engines and compressors embodying the latest design features, and electronic control and measuring devices are among the displays that will be of special interest to gasmen at the May 14-23 International Petroleum Exposition in Tulsa.

The technological advancement of all branches of the petroleum industry since the last exposition in 1948 will be portrayed in dramatic displays in the Hall of Science, probably the most popular single feature of the exposition.

The important role of gas in the petrochemical industry will be depicted for the first time. Leading technologists have been at work for some time designing and selecting exhibits that will show the impact of developments in this industry on everyday living and its contributions in the home, on the farm, and in the factory.

More than 1500 exhibitors will participate in the 10-day, thirtieth anniversary event. Proposed exhibits are estimated to be worth over $100,000,000 and the exposition is expected to attract visitors from more than 50 nations of the world as well as 20,000 oil men from this country.

Among other exhibits will be transmission equipment that simultaneously carries oil, gas, and other petroleum products within the same system without mixing them, and an electron microscope and other apparatus for modern research on crude petroleum. Exhibits will be arranged in the order the activities take place in the operation of the industry, beginning with geology and ending with manufactured products ready for consumption.

A three-dimensional geologic time table will be among the first of the exhibits in the geologic section, which will include examples of the many devices used to locate oil. Well-logging methods with working samples of radioactivity recording equipment (neutron and gamma ray devices) as well as electrical measuring devices will be demonstrated and explained so that both technician and layman can understand.

Another focal point of interest will be the refining exhibit where observers will find an intricate model of an Orthoflow unit, one of the latest developments in the catalytic cracking process. The scope and importance of petroleum transportation will be shown in a display of model layouts of transportation systems, planned to lend emphasis to many of the operations. Other exhibits will show the latest innovations in drilling bits and drilling muds, and well completion techniques, including a display of the latest steel fracturing processes.

The Hall of Science, the world's foremost museum devoted exclusively to petroleum and its products, will again be the scene of a huge exhibit depicting the technological progress of the petroleum industry when the International Petroleum Exhibit opens in May.

energy is included to point out the supply and demand relationships existing between natural gas and the other fuels.

The 11 chapters in the book discuss the history and nature of natural gas, utilization, chemical manufacture of synthetics from natural gas, production, reserves, transportation, taxation, public control, conservation, and competition.

The book has 316 pp, 60 illustrations and 90 separate tabulations. It is available from the Bureau of Business Research, Austin 12, Texas. Price, $5.

PICK YOUR SAFETY TARGET and A GRAY DAY FOR O'GRADY — The foremen's key position in the plant safety program is the theme of these two safety films released by the National Safety Council, 425 N. Michigan Ave., Chicago.

Pick Your Safety Target is an all-color cartoon film based on actual accident-reduction plans within industry and sets forth a three-step plan for detecting accident causes and taking corrective action.

A Gray Day for O'Grady employs a series of comedy situations to dramatize the high cost of accidents. Both films are available in 35-mm sound slidefilm and 16-mm sound motion picture. For additional information and prices contact the National Safety Council.

RECOMMENDATIONS FOR THE INCINERATION OF COMMERCIAL AND INDUSTRIAL WASTE MATERIALS — This is Information Letter No. 52 issued by the AGA's commercial processing committee.

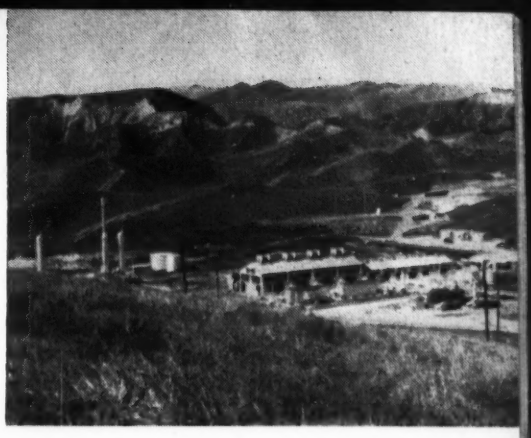
Believing that there is a large market for the sale of gas as an auxiliary fuel to eliminate smoke in the disposal of large volumes of commercial and industrial waste material, the committee has prepared the letter to classify types of waste and the types of incinerators. Descriptions and recommendations for the design of equipment are also presented.

Sufficient data are provided to enable proper analyses of the disposal problem of any commercial or industrial establishment and to recommend incineration equipment of the proper size and type to dispose of waste material in a manner to comply with smoke abatement regulations.

A JOB FOR WOMEN, PRODUCTION AT ANY AGE, THE DISABLED CAN WORK, and THE WORKER AND HIS HEALTH — This series of four pamphlets concerned with the health and productivity of the nation's workers has been prepared by the Office of Defense Mobilization.

These publications contain information particularly useful to the employer in that they deal with the two major problems confronting him: sickness absenteeism and labor turnover.

Copies of the booklets are available from the Office of Defense Mobilization, Washington 25, D. C.



Installation No. 1 in this story is Sunray's gas-gasoline plant.

Storing and handling oil in natural gas compressor stations

By **STEPHEN S. MYRICK II** • P. S. Magruder, Operator, Avenal, Calif.

The concentration of investment represented by modern gasoline and compressor plants makes it imperative that proper methods be used to protect the machines from damage. Consequently, the problem of the handling, storage, treatment, and final disposition of lubricating oils in these plants has become one of major importance. In this article, Mr. Myrick examines in detail the methods presently in use in three typical plants.

THE enemies of lubrication are the same today as they have been since time immemorial. Sand, dust, grit, bugs, beetles, water, coked oil and sludge, all take their toll unless they are eliminated. The lady bug may be your best friend in your garden or orchard but friendship should cease when she gains entrance to your lubricating oil can.

For many years some operators guarded the cleanliness of their lubricating oil with great care but failed to put air filters on engine intakes and crankcase breathers, thereby permitting sand and dust to do their damage whenever dust or sand storms occurred. Similar damage can result from allowing foreign substances to be blown into open lubricating oil barrels, tanks, or measuring and filling cans.

Sizes of engines, and the number of engines in a given plant, will, in large measure, determine the methods and economics of storing and handling the lubricating oil. In small single-engine installations, lubricating oil will be transported, stored, and handled in small quantities, rarely exceeding a barrel. Too often in some small or isolated location proper care is not taken to prevent contamination of oil in measuring cans and other containers and, in some cases, crankcase oil is not changed until someone determines by dipping his fingers into the sump that the consistency has become about equal to that of thick molasses.

Owing to the economics involved, it is rarely possible to have full standby capacity when engines deliver from 300 to 1500 hp each. It has, therefore, become increasingly important that the time the engine is out of service for inspection or for oil changes or for maintenance and repair be reduced to a minimum.

It has likewise become increasingly important in large plants that the physical labor and time required to perform the routine duties be kept at a minimum.

In some plants oil is delivered weekly from central warehouses in barrels and then transferred from the barrels into comparatively small bulk storage tanks either by gravity, hand pump, air pressure, or by mechanical pumping. From the tanks, it is dispensed manually in measuring cans. Large plants having railroad sidings frequently arrange for shipments by railroad tank car lots, whereas those not so located take large bulk deliveries by tank truck and trailer loads. In both instances the tank cars and trucks are used exclusively for lubricating oil service in order to preclude the possibility of contamination by other liquids.

Those companies receiving and handling lubricating oil in bulk report substantial savings in the cost and handling of the product. Such methods may warrant investigation by some plants not now enjoying these benefits.

When the lubricating oil is handled in bulk or from barrels to bulk it is practically in a closed system which, if connections and connecting hoses are kept clean, gives a maximum security against contamination until such time as the oil may have to be handled in open containers. When the oil is placed in measuring cans it is customary to put clean lint-free cloths over the top to keep out sand, dust, or bugs. It should be unnecessary to mention that the cans themselves should always be kept clean, free from moisture, and, if possible, in a dust-proof cabinet.

Inasmuch as details often spell the difference between successful and unsuccessful operation it may be interesting to report the methods presently used for handling lubricating oil in a few typical plants.

The first installation to be discussed* has both a compressor and natural gaso-

Mr. Myrick, plant foreman for P. S. Magruder, operator of the Western Gasoline Plant, has been affiliated with the natural gasoline industry for more than 20 years, having joined the Western States Gasoline Corp. in 1930 at what was then a new installation in a new oil field, Kettleman Hills. He is currently secretary-treasurer of the Coalinga-Kettleman chapter of the API.

This article has been adapted from a talk presented before a meeting of the California Natural Gasoline Assn.

*Rancho San Francisco, a Sunray Oil Co. plant in Newhall, Calif.

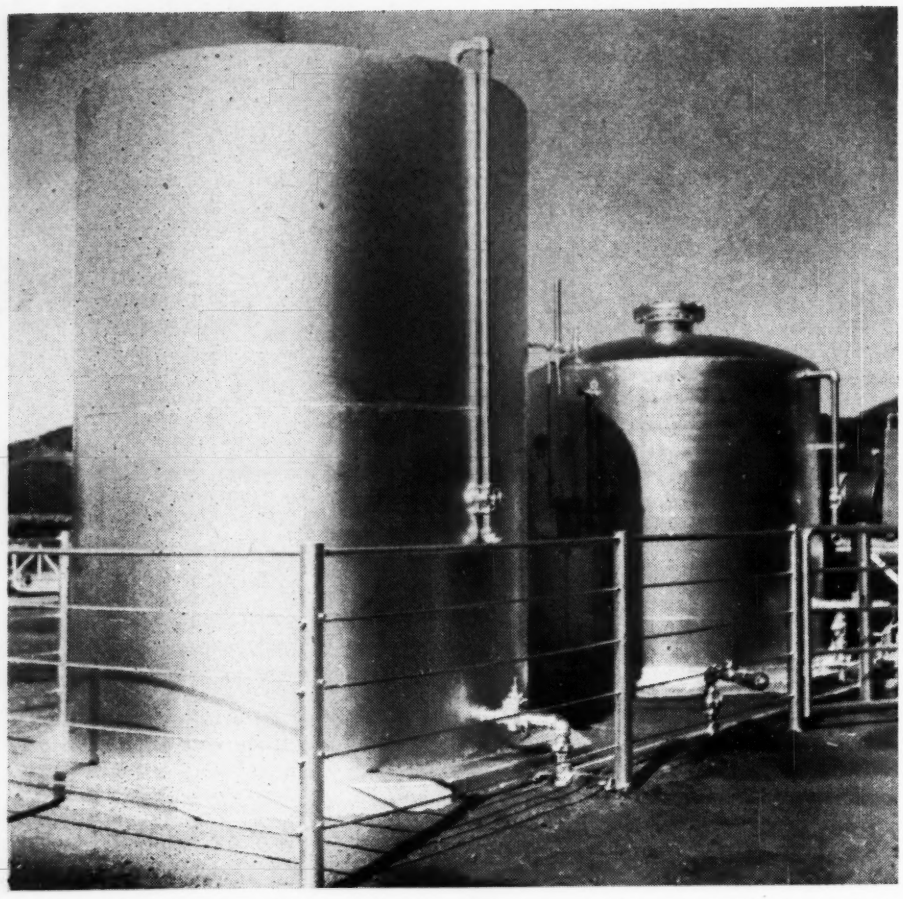


Fig. 1. Two oil storage tanks at the Sunray plant having 2500- and 5000-gal. capacity respectively. The tanks are equipped with gauge glasses.

line plant. The compressor plant performs four stages of compression, taking wet gas at 60 psi and compressing it to dry gas at 2000 psi for injection.

The following number and types of engines are in service:

8 — 600-hp, vertical type, 2-cycle engine driven compressors.

1 — 237-hp, V-type, 4-cycle engine driven compressor.

3 — horizontal engine driven compressors.

46 — multicylinder high speed engine driven auxiliary units.

The manager of this operation says that the purchase of lubricating oil in large lots and handling it in bulk has resulted in substantial savings.

Because of different service requirements, three types of oil are used. One type, used in the larger engines, is purchased and received in bulk, while the other two types, used in smaller multicylinder gas engine prime movers and in gas driven reciprocating pumps, are purchased in 10-bbl lots. The oil that is purchased in bulk is received in truck and trailer loads of about 5400 gals. The trucks are equipped with pumps that transfer the oil into two tanks of 2500- and 5000-gal. capacity, respectively *(Fig. 1)*. The tanks are equipped with gauge glasses.

When the bulk system was first installed, air pressure was maintained within the storage tanks for the purpose of transferring the oil to the desired places. An interesting sidelight is the fact that when the oil was blown by air pressure from the bulk storage tanks into the force feed lubricators, the small lubricating pumps lost suction in what appeared to be vapor or air lock. It was not possible to correct the difficulty until the air pressure was removed from the bul

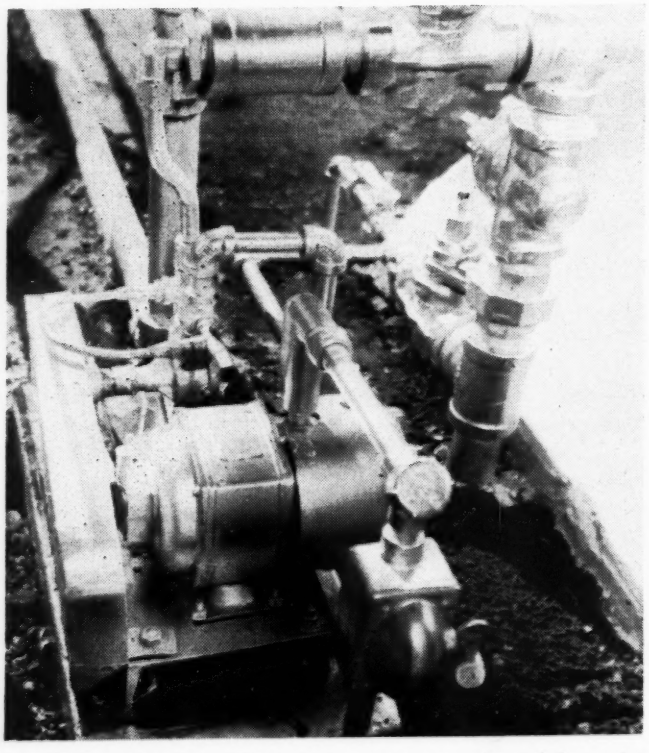


Fig. 2. Small displacement pump used to transfer oil from the storage tanks for distribution.

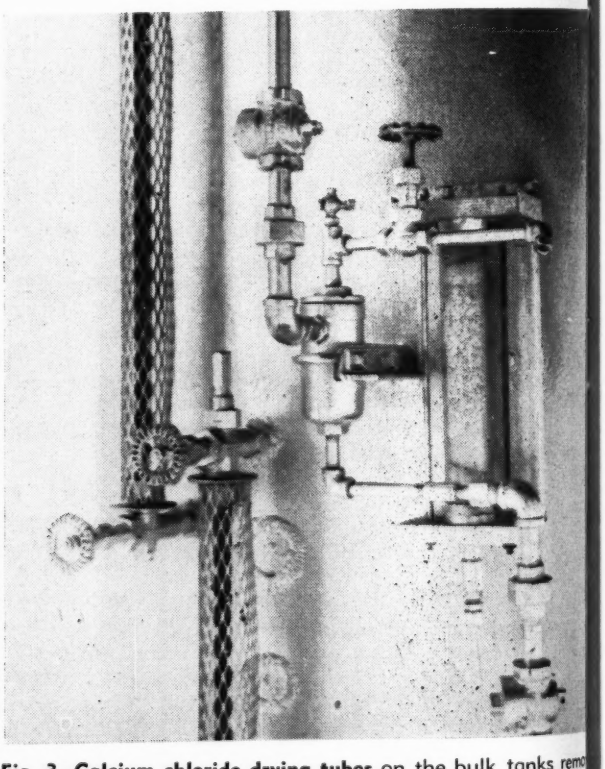


Fig. 3. Calcium chloride drying tubes on the bulk tanks remo moisture taken into the tanks.

tanks and a pump *(Fig. 2)* was installed for transferring the oil, after which no further difficulty was experienced.

Every reasonable precaution is taken to prevent moisture or other contaminants from reaching the oil. The breather connections on the bulk tanks are equipped with calcium chloride drying tubes shown in *Fig. 3* that remove the moisture from air taken into the tanks when they are drained or when expansion and contraction from changes in temperature causes breathing.

As can be seen in *Fig. 4,* the vents are piped down from the top of the tank so that they are accessible from the ground. The portion of the vent that contains the calcium chloride is made of glass. Some small pieces of a chemical indicator, drierite, which turns pink when the calcium chloride has become saturated with water vapor, are included with the chemical. Change in color indicates the need for replacement.

When the piping was installed for bulk handling of oil, the various sections of line were carefully swabbed, after which they were flushed with water. The water was blown out with air, which also was used to dry out the lines.

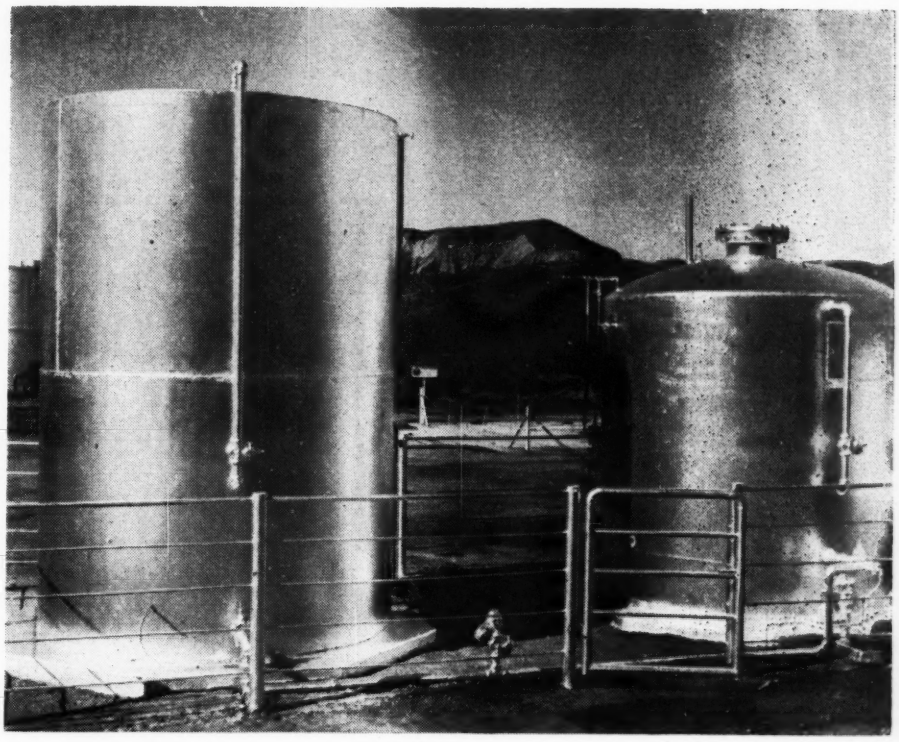


Fig. 4. The vents on the tanks are piped down from the top so that they are accessible from the ground.

Displacement pump

Oil is taken from the bulk tanks by a small displacement pump *(Fig. 2)* having a capacity of 5 gals. per minute and driven by a ⅓-hp electric motor. The discharge line from the oil pump passes through a 100-mesh screen strainer to a centrally located displacement meter *(Figs. 5* and *6)* where the volume is measured for proper accounting purposes. Distributing lines *(Fig. 7)* from the meter are tapped into the crankcase of each of the 600-hp engines. When the oil is low in a gauge glass on one or more engines, the oil pump is started manually and oil is added to each engine in turn by opening the valve on the oil line at the engine until proper level is shown. A spring loaded relief valve from discharge to suction of the pump permits shutting off the flow intermittently without having excessive pressure buildup at the pump or meter.

Oil for both the power and compressor cylinders is drawn through a ¼-in. line from the discharge of the main engine oil pump, passes through an automotive type replaceable cartridge filter, and then goes into the force feed lubricators. The ¼-in. line is tapped into the lubricators in order that they may be kept dust proof.

This plant has another unique feature. An overflow line has been installed from the force feed lubricator back into the crankcase. The operation is controlled in such a manner that a small amount of oil overflows continuously back into the crankcase, thereby eliminating any hand filling of lubricators and maintaining clean oil in a closed circuit.

The old horizontal type engines, and the smaller multicylinder high-speed auxiliary engines, are lubricated manually by use of measuring cans. The oil handled manually is withdrawn from a spigot connection centrally located in the compressor building after the oil has passed through the meter. Miscellaneous oiling of pump and other machinery parts is done with thumb pressure plunger pump type oil cans of about one-quart capacity.

Oil that drips from compressor rods, pumps, etc., flows by gravity through a drip pipe manifold into a blowcase. This blowcase is periodically emptied into barrels by application of dry gas pressure and the waste oil is used around the lease for chain oil or other unexacting service.

When engine crankcases are to be drained for any reason they are drained by gravity through the above mentioned drip pipe system, which is tapped into the engine crankcases. The valve on the drain piping at each engine is kept locked so that the crankcase may not be drained by accident. All measuring cans are kept in closed metal cabinets to protect them from rain, dust, or other contamination, and the cans are kept covered when removed from the cabinets. Special care is used in the handling of barrels of oil. They are either laid on their sides or tilted at such an angle that water or moisture may not gain entrance as a result of accumulation on top of the barrel.

Gasoline plant

The gasoline plant, which is located nearby, was designed to operate in such a manner that there is no low pressure dry gas available for engine fuel. The pressure of the fuel gas must be reduced from about 170 psi to 30 psi. This is accomplished by expending the gas through the power cylinders of reciprocating pumps, thereby utilizing the available energy for useful work. The gas is heated to a temperature of 170° F and the power cylinders must be lubricated.

The lubricating oil used for this service is the same as that used for the large engines and is piped from the tanks through a ½-in. pipe to a 150-gal. bulk tank at the gasoline plant, from which it is manually dispensed to force feed lubricators by the use of measuring cans.

It was thought that this service might

Fig. 5. The displacement meter where the oil is measured before it goes to the engine.

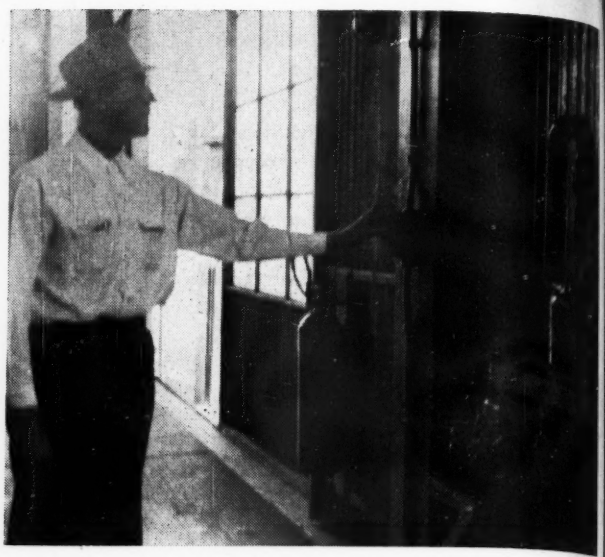


Fig. 6. The pump is started by means of the manual starting button on the post.

present a lubricating problem. In order to secure a better mixing of the oil with the gas used for power, a ⅛-in. pipe nipple was slotted in half and a dam at the end was made by burring up the end of the nipple. This was inserted with the open section up, against the downward flow of the gas in the vertical gas line to the cylinder. The lubricating oil enters the ⅛-in. connection and flows over the sides of the slotted section. The insertion of the ⅛-in. pipe nipple also reduces the cross sectional area of the gas pipe and causes an increase in velocity, if not actually a jetting action. The lubrication has been most satisfactory inasmuch as the cylinders have shown no wear and the rod packing has not been changed in nearly four years of service.

This company also has a number of multicylinder high speed engines operating unattended in isolated locations. In order to insure proper crankcase oil levels, barrels of oil have been installed on racks higher than the crankcase. The oil is piped to a small float controlled valve on the side of the engine to maintain a constant level.

Second plant

The second plant, in wet gas compression service in an oil field production operation, has two 600-hp, 4-cycle, V-type engines operating at 330 rpm, and three 600-hp, 2-cycle vertical engines operating at 300 rpm. The compression is in two stages. Each of the engines is equipped with an oil type air cleaner, an edge type filter, and a clay pack filter.

One type of oil serves all purposes at this plant. It is moved weekly from the main warehouse in barrels by motor truck to the plant and is unloaded onto a platform equipped with a traveling chain hoist suspended from an overhead steel beam. Beneath the platform there are two 210-gal. bulk tanks. A connection with a valve on it is attached to the bung on the barrel. The barrel is then raised and inverted so that the connection on the barrel can be lowered through a 2-in. fitting on top of one of the bulk tanks. Finally the valve is opened and the contents emptied from the barrel to the bulk tank by gravity. Measurement of the oil in the bulk tanks is obtained by means of a dip-stick, which slides through a ½-in. connection on the top of each tank.

Except when being filled, air is applied to each of the bulk tanks at a pressure of 5 psi through a small ¼- and ½-in. air piping manifold, which takes air from the plant air supply system. Pressure is regulated by a ¼-in. pressure reducing valve and protection from excess pressure is provided by a 1-in. relief valve. Piping (¾-in.) is run from the bulk tanks through the wall of the compressor house to a rack where measuring cans are kept. From this point all of the oil is delivered to the engines manually in measuring cans.

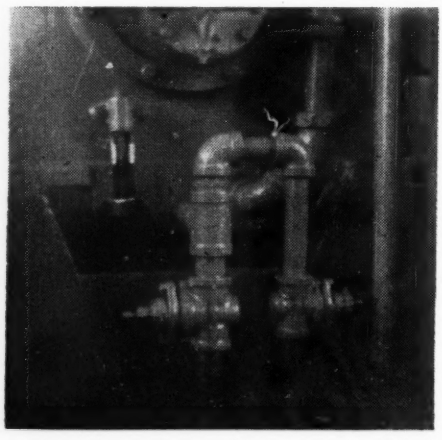


Fig. 7. Distribution lines from the meter are tapped into the crankcases of each of the 600-hp compressors. At left is the gauge glass.

Extra precautions

No extra precautions have been taken to dry the air that is admitted to the tops of the bulk storage tanks, but no cloudiness, water contamination, or oxidation of the lubricating oil has been observed.

Each of the engine crankcases has a sight glass level gauge. Whenever required, oil is added manually from bulk storage outlets to both the crankcases and the force-feed lubricators that supply oil to the power cylinders. The oil required for the compressor cylinders is withdrawn from the crankcases by removing it manually from the oil line on the clean oil side of the filters into measuring cans and adding it to the compressor cylinder force-feed lubricators. When handling the oil manually in measuring cans, a precaution against dust and bug contamination is taken by placing a clean cloth over the top of the container.

While no difficulty was reported as a result of using the cloth, one observant manager has called to my attention the fact that lint from clean rags has been observed to have caused plugging of force feed lubricators. He has given serious consideration to the use of plastic

"I could see the corpsman kneeling over me. The blood plasma was running down through a tube into my arm and he said everything was going to be O.K. I was walking across an enemy mine field in Seoul when one exploded and a piece of shrapnel caught me in the leg.

"'Got enough of that stuff?' I asked him, pointing to the blood. 'I guess we never have enough,' he said, 'but you can thank *somebody* for this pint.'

"How do you thank 'somebody' for blood? For saving your life? When I got back home, I discovered the answer at my local blood donor center. There's only *one* way to say thanks—by giving some of your own blood."

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- ☐ Have you given your employees time off to make blood donations?
- ☐ Do you have a Blood Donor Honor Roll in your company?
- ☐ Have you set up a list of volunteers so that efficient plans can be made for scheduling donors?
- ☐ Have you arranged to have a Bloodmobile make regular visits?
- ☐ Has your management endorsed the local Blood Donor Program?
- ☐ Have you informed employees of your company's plan of co-operation?
- ☐ Was this information given through Plant Bulletin or House Magazine?
- ☐ Has your company given any recognition to donors?
- ☐ Have you conducted a Donor Pledge Campaign in your company?

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covers in place of cloth or possibly the use of measuring cans with tops that stay normally closed similar to those on old German beer steins.

Proper cooling of the lubricating oil in use is essential. If the oil is maintained at too high a temperature, there may be a tendency for its viscosity to increase; if maintained at too low a temperature, combustion vapors including water may not be properly vented and may result in sludge formation.

In this plant, the oil is cooled from a high of 140° down to 132° F for the three 600-hp, 2-cycle engines. The crankcases of these engines have not been drained in more than 63,000 hours of service. On the other two 600-hp, 4-cycle engines, the oil is cooled from a high temperature of 152° down to 132° F. The crankcases of these two engines have been drained annually.

The crankcases are drained manually and the drained oil is put into barrels. This company, which has several compressor plants in the one field, hauls all crankcase drainings to a central treating plant where the oil is heated to 275° F, centrifuged, and transferred to a cone bottom tank for additional settling. The oil so treated is used for oiling exposed chains on heavy drilling equipment.

Third plant

The third plant studied is in dry gas transportation service. This plant has four 1320-hp, 4-cycle, V-type engine driven compressors, four 1760-hp, vertical type 2-cycle engine driven compressors, and three 570-hp vertical type engine driven generators.

All engines are equipped with wool-felt air filters and edge type oil filters. Each of the V-type engines has three waste pack filters, and each of the vertical type engines has a 3-in. auxiliary filter on the oil lines. None of the engines have filters on crankcase breathers.

The lubricating oil for all units is cooled in shell and tube coolers from a crankcase temperature of 160° F to about 145° F. The temperatures are automatically controlled by instrumentation, regulation, and butterfly bypass valves on the water piping. The engines are also equipped with low oil pressure and high oil temperature alarms.

Different types of oil are used for the three different types of engines, but all are handled in bulk and in the same manner. The bulk lubricating oil storage consists of five 7500-gal. tanks; one for each of three types of oil, one spare, and one for storage of drained or dirty oil. Oil is transferred from tank trucks and trailers, which are used exclusively for lubricating oil service, by pumps on the trucks into the bulk storage tanks through piping manifolds.

Each of the storage tanks is equipped with a 3-in. breather connection that is screened but is not equipped with any drying agent. Each of the three oils is handled in a separate system, but since each of the three systems is identical, the description of one will cover them all.

Suction is taken from the bulk storage tank by a helical gear positive displacement pump, which discharges the oil into a 150-gal. surge tank. A line from the plant air system admits a small volume of air through a fixed orifice to the top of the surge tank and a pressure of 90 psi is maintained. A reflex gauge glass shows the level within the tank.

When oil is withdrawn from the surge tank, the small orifice in the air line restricts the flow of air and the pressure within the surge tank drops. When the pressure drops about 10 psi, a sensitive pressure switch in the electrical system actuates a relay that starts up the positive displacement pump that, in turn, maintains the oil liquid level in the surge tank. There is, therefore, always a supply of lubricating oil available at a pressure of 90 psi.

From the surge tank a 3-in. pipe, with connecting 1½-in. branches, leads to each of the engines that use the same type of oil. The branch line to each engine has a 1½-in. Y-screen strainer and a 1½-in. register flow meter, so that all the oil delivered to any engine is recorded on its own meter. After the piping leaves the meter, it branches so that one line equipped with a 1-in. sight glass is tapped into the crankcase and one line swaged down to ¼ in. is tapped into the side of the force feed lubricators. When oil is required, as indicated by the liquid level gauge glasses, the operator opens the proper valve and the oil is blown from the blow case either to the crankcases or to the force feed lubricators.

This plant has two drainage systems for the crankcase oil. One is "the dirty oil system," one "the clean oil system."

The dirty oil system consists of a 2-in. drain connection from each crankcase connected into a 3-in. line that drains by gravity into a covered 4-ft square by 8-ft deep concrete sump. This sump is equipped with an electric motor driven deep well turbine pump, which has an adjustable level switch for automatic starting and stopping. The pump transfers the dirty oil from the sump either into the 7500-gal. dirty oil bulk tank or into trucks whenever the oil is sold to reclaimers. When the oil is not sold to reclaimers it is spread on roads. When shipping the dirty oil from the 7500-gal. tank, trucks may be loaded by gravity if the tank is full, but when the tanks are not full the dirty oil is allowed to drain into the sump and the sump pump transfers it to the trucks.

Two-in. branch lines from all engine crankcases connect with a 3-in. clean oil drain header into a 1200-gal. tank. Whenever crankcase oil, which is still serviceable, is to be drained from any engine for any cause, it is drained by gravity into the 1200-gal. tank. The tank has a manhole for inspection and cleaning purposes. From this tank the oil may be drained to the dirty oil sump. If, however, the oil is to be returned to the engine for further service, the 1200-gal. tank, which was designed as a pressure vessel, is subjected to a pressure of 90 psi by air taken from the plant air system. All of the auxiliary filters on the engines can be bypassed through piping manifolds so that they may be replaced or reloaded while the engine is in service.

In each case when oil has been drained from the engine and is returned to it, the oil passes through a sight glass and through the auxiliary filters before reaching the crankcase.

No oil change

The plant manager advises that except for two occasions when foreign matter and water were found in the lubricating oil no oil changes have been made on the 2-cycle engines whereas the oil has been drained from the 4-cycle engines after about 1500 hours of service because, by that time, the neutralization number of the oil has reached 1.5 milligrams of potassium hydroxide. The company plans to install auxiliary clay filter packs on the 4-cycle engines in an effort to secure longer service from the oil.

While no measures have been taken to remove moisture from the air used for the oil blow cases other than the use of regular air receivers, no contamination or deleterious effects are reported from moisture, oxidation, or air absorption.

Many plants have laboratory examinations made of crankcase oil from time to time. In addition to the general physical characteristics of the oil, reports of the tests reveal the presence of any metal and its type, and may warn of extraordinary wear or impending bearing failure.

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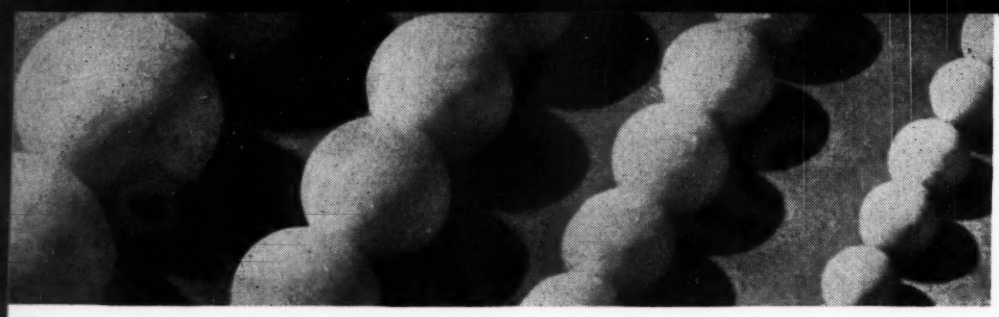
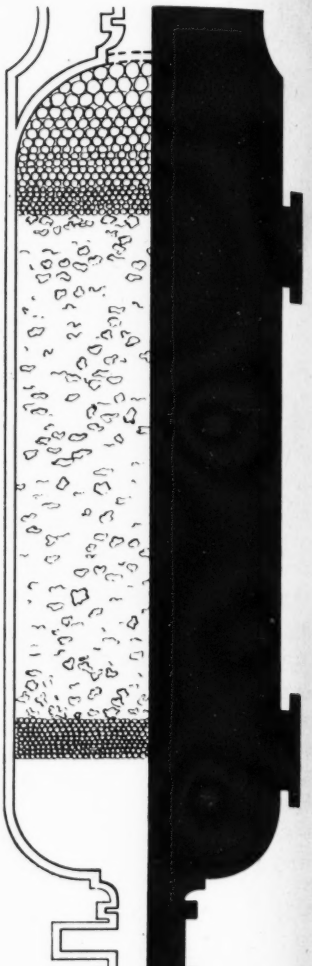


Fig. 1. Shown below is a typical precontactor unit. Both top and bottom layers consist of tabular alumina balls like those shown at left. The middle layer is F-1 activated alumina granules. Screen mesh outlet at bottom keeps balls from dropping through.



With proper care, you can use desiccants years longer

By BOYD F. KOEPKE* and V. M. STOWE†

IN many cases years can be added to the life of solid desiccants by reducing the amount of contamination, by using suitable reactivation conditions, and by avoiding mechanical damage.

The Aluminum Co. of America, working with some forward-looking gas producers, has pioneered in the use of activated alumina for drying high pressure natural gas. The uses of Alcoa activated alumina and other desiccants are well known: in dehydration of residue gas from gasoline plants for pressure maintenance and recycling or for sale to transmission pipeline companies; in dehydration of raw gasoline products and LPG for transportation by tank truck, tank car, tanker, or by pipeline; in drying liquid products or natural gas upon withdrawal from underground storage; and in drying instrument air. Other major uses for solid desiccants that may not be so familiar are in wind tunnels, in dehydrators for de-commissioned naval vessels, in liquid air plants, and in drying many other commercial gases, such as hydrogen sulfide, nitrogen, carbon dioxide, hydrogen, and oxygen.

In practically all of these uses solid desiccants have a much longer effective service life than they do when used in drying high pressure natural gas. For instance, the first activated alumina ever used commercially for drying furnace atmosphere to heat treat steel is about 21 years old now and is still going strong. What can be done, then, to increase the effective life of solid desiccants in drying natural gas, LPG, and petroleum products?

In drying natural gas, contaminants offer a serious problem for all solid desiccants. Among these contaminants may be distillate, oils, brine, and dust. Heavy fractions may be adsorbed and not removed during reactivation. An accumulation then builds up on the desiccant that takes up space that should be used for adsorbing water. On repeated reactivation, the material chars and polymerizes. No solvent is known that will remove the material. Tests have been made by washing with naphtha, alcohols, ketones, aromatics, and other organic solvents, but none of them improve used desiccants of either the silica or alumina type to any practical extent. However, dust, fines, or any water-soluble impurities such as salt can be hosed out without damage in the case of activated alumina since it is completely resistant to the action of liquid water.

Incidentally, the ability of activated alumina to withstand liquid water is not limited to one treatment. It can be reactivated and immersed again and again with no shattering. Such repetition will, however, shatter even the more resistant types of some other desiccants. This resistance is of practical importance because slugs of water are sometimes accidentally carried along with the gas stream and find their way into the desiccant beds. Also, during reactivation, liquid water may condense in the cool end of the desiccant bed.

The best way to handle the problem of contaminants is to remove the co taminating material. This can often b done to a very helpful extent by usi a precontactor, such as the one show in *Fig. 1*.

An an indication of the life and c pacity of a precontactor, we have so data on a small extractor that was us for removing oil from compressed air. was 7½ ft deep, 8 in. in diameter a contained 105 lbs of activated alumi The extractor was operated continuou at 467 cu ft per hr for two years, bur ling a total of 8,180,000 cu ft. At t end of that time, separate layers of t desiccant were sampled and the oil co tent was determined. The inlet layer co tained 12% oil, the middle layer 1 and the effluent end 0.34% oil.

Desiccants that are spent and unab to adsorb water may be set aside for u

* Chemical Products Div., Aluminum Co. of America, Kansas City, Mo.

† Aluminum Research Laboratories, East St Louis, Ill.

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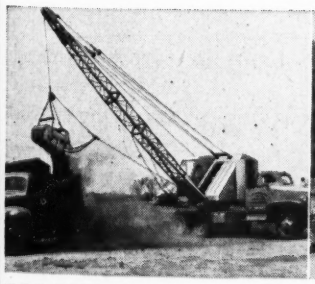

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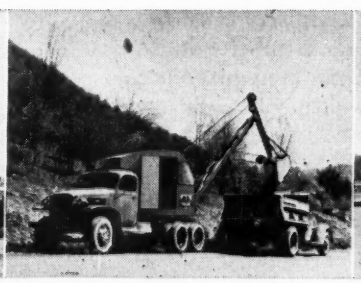

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in such a precontactor since the capacity for further adsorption of oils will still be moderately high.

Passing gases containing heavy oils or distillate through shell and tube condensing units, using water as the coolant, accomplishes three things toward improving dehydration operations: the oil is coalesced in the vapor phase to liquid droplets after which they may be trapped out in an accumulator tank, the moisture content of the gas is decreased, and the gas is cooled before it enters the dehydrators, thereby decreasing the load on the desiccant and increasing the adsorptive capacity for moisture.

Shell and tube units may be equipped with aluminum heat exchanger tubes because of their high heat transfer rate and their resistance to the corrosive effects of hydrogen sulfide, which is often present in the gases being processed. There is room for some brilliant engineering in the design of equipment for the removal of contaminating materials, which will, at the same time, cool the gas prior to its entering the dehydrators.

Service life

Activated alumina shows a service life of as much as four to five years in drying natural gas with 400 grains of hydrogen sulfide per 100 cu ft. However, in cases where traces of oxygen are present in the gas along with some hydrogen sulfide, sulfur is deposited rather rapidly, fouling any type of solid desiccant. When gas is stored underground it probably is important to keep it free of oxygen so that it can be subsequently dehydrated without danger of deposition of sulfur. If a portion is to be burned to adjust heat content, that should be done after final dehydration of the main flow of gas from storage to avoid deposition of sulfur from reaction of hydrogen sulfide with oxygen residues from the burning operation.

In drying LPG, caustic towers sometimes are used ahead of the dehydrators. The carry-over of caustic onto any commonly used desiccant will seriously impair its capacity. This should be avoided by careful operation. Mist extractors may be used to remove the caustic spray.

Another "fountain of youth" for desiccant beds is proper reactivation. Reactivation should be carried on until the entire desiccant bed reaches the minimum temperature recommended by the manufacturers of the desiccant. In the case of Alcoa activated alumina, this is 350° F. If the temperature is too low, heavy fractions and even water begin to linger, reducing the capacity.

It is good operating practice to reactivate desiccants promptly after use. Especially before any standby period, the desiccant should be reactivated and valved off. This will get rid of some of the heavy fractions, which might otherwise polymerize and also get around any slow deleterious action of adsorbed water.

In reactivation, it is usually best to have the gas flow direction opposite to the on-stream direction. Then water and heavy fractions can be removed from the inlet and without having to be swept all the way through the bed.

There are several safety-first rules for avoiding accidental death to desiccant beds by mechanical means. Sometimes when new wells are brought in or gas throughput becomes excessive, desiccant beds are operated above rated capacity. In such cases, the possibility of setting up a turbulent condition inside the dehydrator, should be considered. While a dehydrator may be suitably designed for the rated flow, increased flow may blow a deep crater in the top of a bed and pulverize the desiccant. Sometimes a baffle plate may be introduced to avoid this difficulty. If the flow is upward, the entire bed may be lifted and abraded. This can be avoided in some cases by completely filling the top space with tablar alumina balls.

Tabular alumina takes its name from the tablet-like appearance of its crystals under low power magnification. The product is essentially 100% alpha alumina, which is produced at temperatures in excess of 3000° F. This material is free from combined water, "pre-shrunk," and can have either low or high porosity as desired. It is virtually indifferent to its environment, being resistant to attack from all aqueous acids and bases with the single exception of hydrofluoric acid in which tabular alumina is very slightly soluble. This resistance to attack is characteristic of the material up to its softening point, which is in excess of 3500° F. It is completely unaffected by oxidizing or reducing atmospheres at all temperatures below its softening point. Tabular alumina is available in two standard dense grades and in special grades having porosities to a maximum of about 30%.

Reactivation conditions should be adjusted so that slugs of liquid distillate and water are not trapped in the desiccant bed. It is easy to see that this condition, with gas bubbling up through the liquid, will erode the desiccant seriously and the shattered fragments will in some cases be accumulated in drifts that cause channeling in the bed. Sometimes hard cakes of pulverized desiccant form from this cause. This condition will be avoided by any means for reducing the amount of liquids condensed in the bed, such as using enough reactivation gas to carry the material as vapor, reactivating while the bed is still warm from adsorption, or bringing the temperature up slowly at first. In some cases, where much distillate is present, it may be necessary to reactivate with a downward flow of gas so that any liquids condensing will be swept out promptly.

When pressure is released on any high pressure system it should be done at a point where the gas will pass downward through the bed, and slowly enough so that the bed will not be disturbed.

Exercising caution

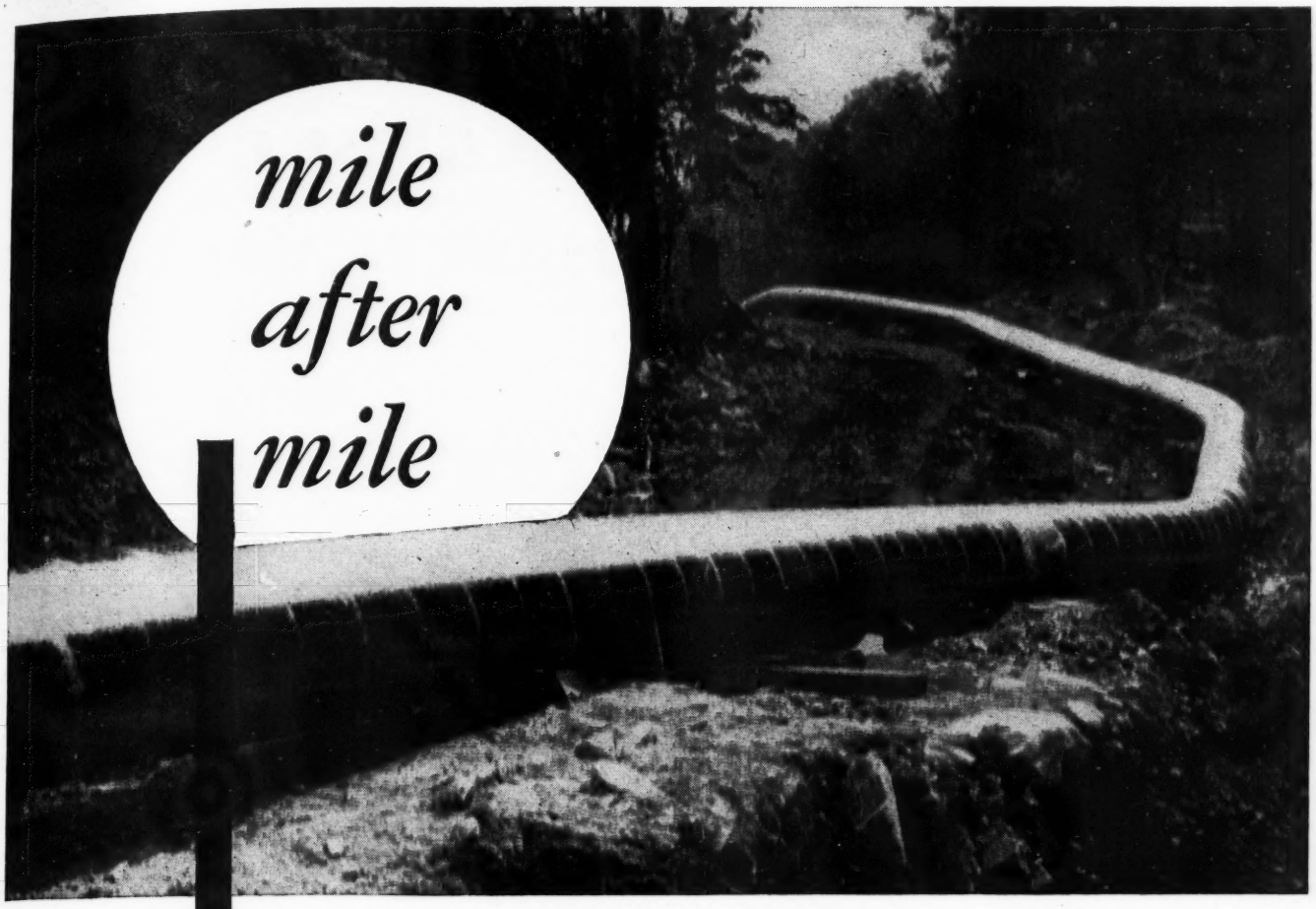
All operators who use compressors for taking suction on the discharge side of dehydrators should exercise caution. If the gas is compressed to higher pressures for gas injection, they should use some medium for catching the fine dust particles from the desiccant bed created by the slight movement during the dehydration and reactivation operations. To protect the compressor cylinders from scoring, bag type filters or an oil bath type scrubber are good for retaining the fine dust particles that are so very abrasive to mechanical moving parts.

Dehydrators should be so designed as to minimize mechanical vibration and pulsation of flow, especially when compressors are used, to prevent abrasion of the desiccant by agitation.

Finally, a desiccant bed may bleed to death. It is embarrassing to have a screen or support grate fail, and to discharge the desiccant miles downstream in the pipeline. This can be avoided by use of tabular alumina balls of properly graded sizes in layers, with only a small rugged grate supporting the largest balls around the exit pipe.

Solid desiccants are powerful, rugged, require little attention at their work, and are long-lived. By following the suggestions outlined above, i.e. removal of contaminants, use of suitable conditions of reactivation, and avoiding mechanical damage, the service life of desiccants used in drying hydrocarbons should approach the long life attained in other fields.

This article is adapted from a paper presented at a recent NGAA meeting.



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The role of fibrous glass mats in pipeline corrosion control

While the use of fibrous glass mats for the reinforcement of underground pipeline enamels is generally accepted today, the theory of the function of the fibrous glass as a reinforcement is still not well known. In this article, Mr. Farris describes the theory and supporting test procedures that have made possible the development of these glass mats.

By R. W. FARRIS • Owens-Corning Fiberglas Corp., Toledo, Ohio

IN the development of fibrous glass mats for the reinforcement of underground pipeline enamels our company followed the same theory that we used in our approach to the reinforcement of both thermoplastic and thermosetting resins. This approach was based on the assumption that coal tar enamel could be treated in very much the same manner as a thermoplastic resin. Our experience had shown that glass fibers of the correct type would materially increase tensile strength and impact resistance and decrease crack propagation in thermoplastic resin.

With this experience as a background, the first application of a fibrous glass pipe wrap material was made in cooperation with the Magnolia Petroleum Co. in May 1939. Since water-dispersible thermosetting resin binders were not economical at that time, mats of fibrous glass were first bonded with starch and then coated with asphalt. The finished weight of the wrap was 9.5 lbs per square. As a result of this first experiment, we decided that further development was desirable. A second trial in the spring of 1941 was more successful than the previous trial but because of the outbreak of World War II late in the year, it was necessary to postpone the development of this product.

Thermosetting resins

In 1944, water-dispersible thermosetting resins became readily available and we were able to produce a fibrous glass mat, bonded with a polymerized furfuryl alcohol resin. The first application of this material was on a Texas-New Mexico Pipe Line Co. line in September 1944 and February 1945 but it was far different from the material that is known today as it contained only the single filament fibers. It was not until some time later that attempts were made to include a continuous textile yarn fiber (glass textile yarns are made up of 204 single filaments twisted together). The theory behind the use of textile yarns can be illustrated best by the fact that a man can break one stick at a time but finds it impossible to break a large united bundle of the same sticks.

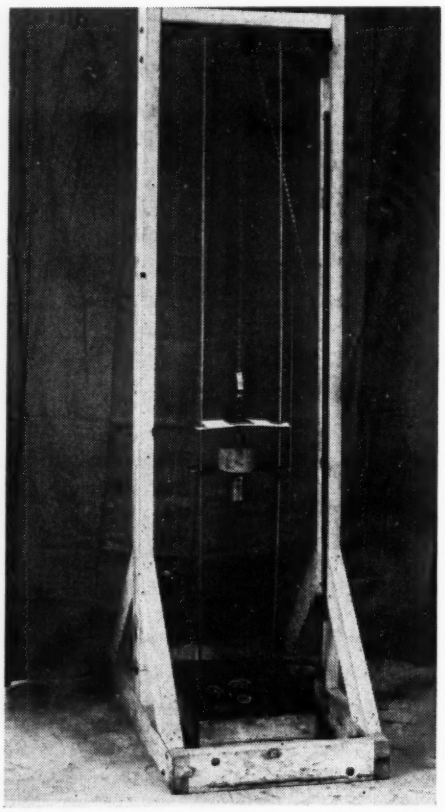


Fig. 1. Drop impact tester used to test coal tar enamels (with or without reinforcement) on 12x12x¼-in. steel plates. Test results show that glass mat reinforcement alone improves impact resistance about 300%.

Glass textile yarn was first added in a continuous swirl pattern and then a little later, a fibrous glass pipe wrap material reinforced with parallel glass textile yarns was applied on a Great Lakes pipeline job. The change from swirl pattern reinforcement to parallel pattern reinforcement showed to a very great advantage during the application of the wrap in that fewer breaks occurred during the wrapping operation, thus decreasing the wrapping machine shut-down and increasing the number of miles wrapped per day.

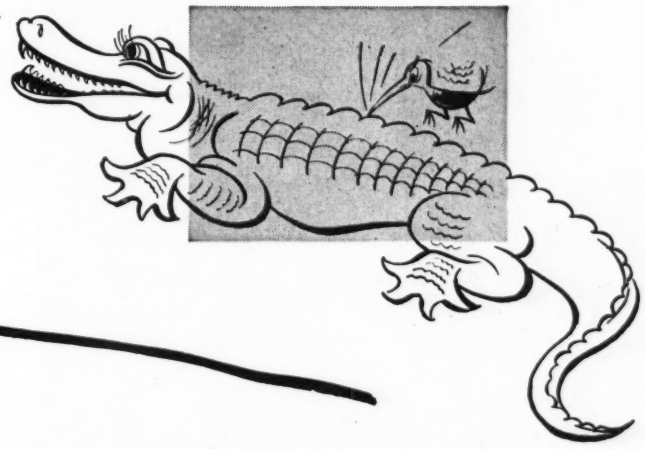
Reinforcing requirements

The two requirements of a reinforcing medium are that it must be stronger than the material that it is reinforcing and must have a service life equal to or greater than the material to be reinforced.

Bulk glass, such as a window pane, has a tensile strength of about 10,000 psi while standard production glass fibers have a tensile strength ranging from 200,000 to 300,000 psi. Such strength compares favorably with very high grade steel, which has a tensile strength of 300,000 psi. The "rate of crack propagation" theory of glass strength indicates that it should be possible to obtain a maximum tensile strength of about 900,000 psi but to date this high strength value has not been achieved although continual improvements are being made in this direction.

The service life of the glass depends upon its composition. There are many glass compositions, each of which is de-

Like the 'Gator's tough skin that shields what's within . . .



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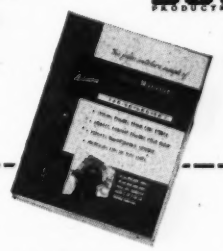

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Fig. 2. Unreinforced enamel after exposure to 180° F temperature for 24 hours. The parallel lines scribed on the surface have been eradicated by the heat sag.

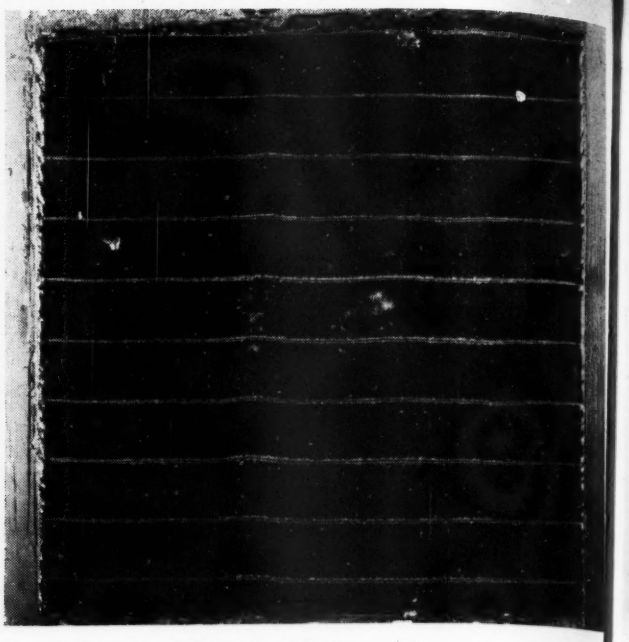


Fig. 3. Enamel reinforced with fibrous glass mat after the same test shows only slight deviation in the formerly parallel straight lines.

signed for a specific use. Some glasses are readily soluble in water while others have a very high resistance to attack by chemicals and weather. Our company uses a highly chemical-resistant borosilicate glass for the reinforcement, thereby providing the highest possible resistance to attack by soil acids and moisture.

Glass mat is used on underground pipelines either as a reinforcement for coal tar enamel or as the base mat for an outer wrap. The mats used for reinforcing are of two distinct types, one constructed of single filament glass fibers having glass textile yarn parallel reinforcement and bonded together with a thermosetting resin, and the other constructed of only single filament glass fibers bonded together with a thermosetting resin.

Six laboratory tests are normally used to determine the quality of a glass mat. These tests are as follows:

Tensile strength is measured at both room temperature and at 450° F (approximate coal tar enamel application temperature) in a longitudinal direction to determine whether the mat has sufficient strength to withstand the rigors of application.

A trapezoidal tear test is the second test. In it, the specimen is clamped in the jaws of the testing machine so that the force is applied in concentration and the tear progresses across the sample.

The porosity of the mat is measured

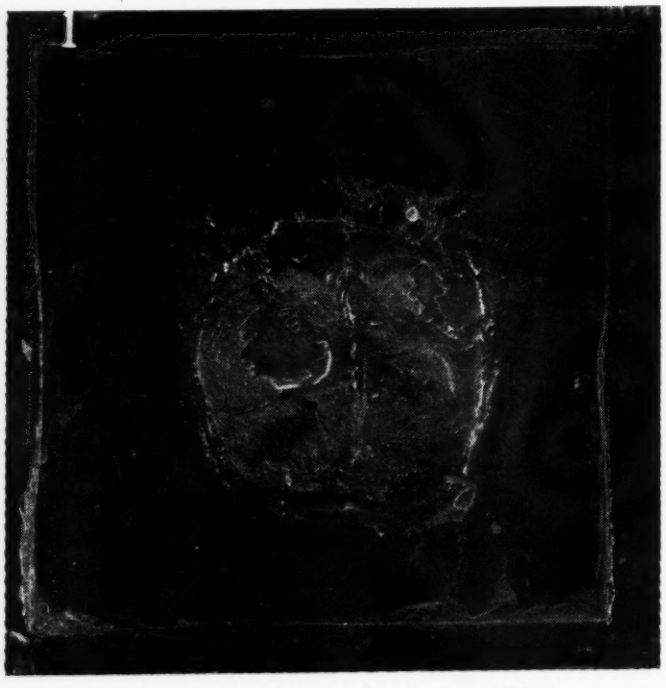


Fig. 4. Unreinforced enamel failed to pass the 20,000-volt electrical test after one cycle of the soil stress test.

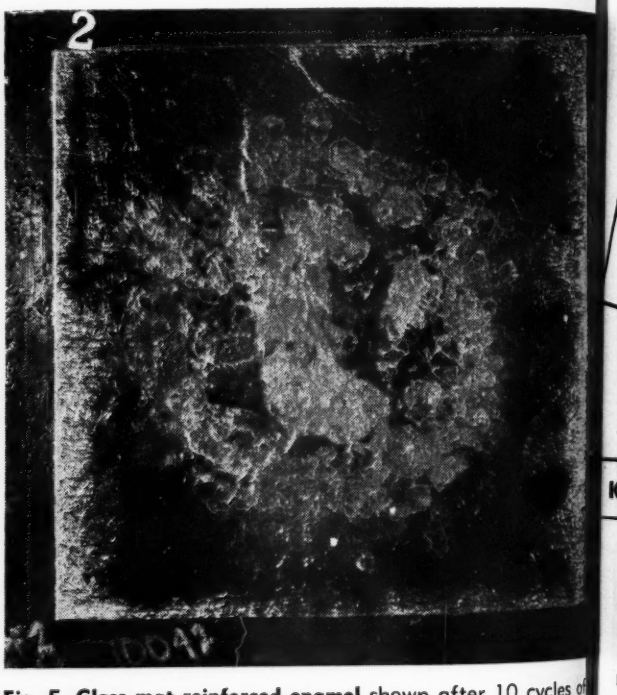
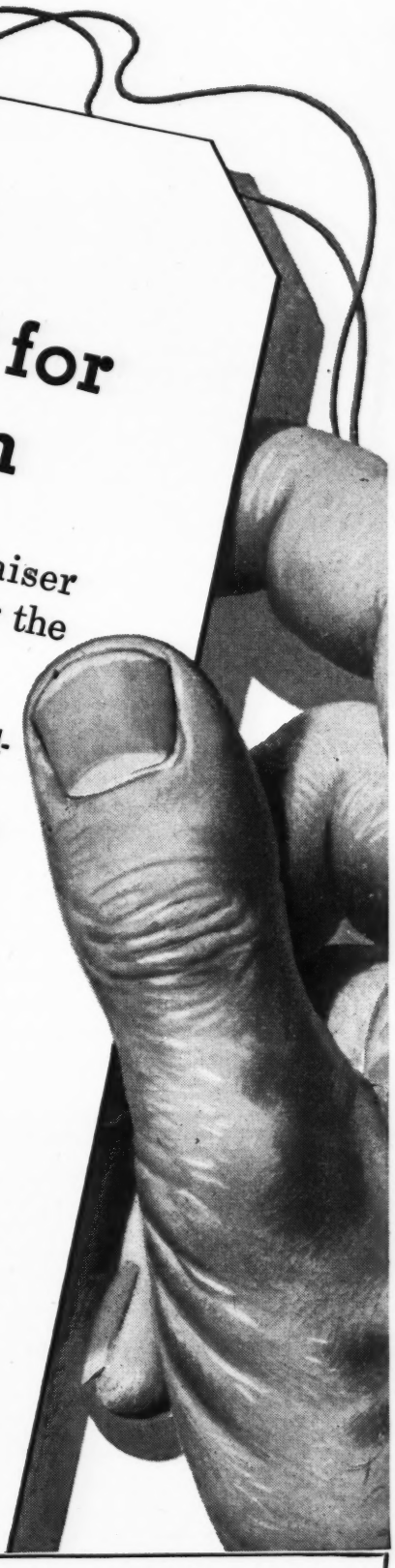


Fig. 5. Glass mat reinforced enamel shown after 10 cycles of soil stress test. After 18 cycles there was still no failure.

Just the ticket for line pipe men



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Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	8⅝" to 20" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5 9/16" to 12¾" O.D.	Up to 55'	.188" to .375"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	22" to 30" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser

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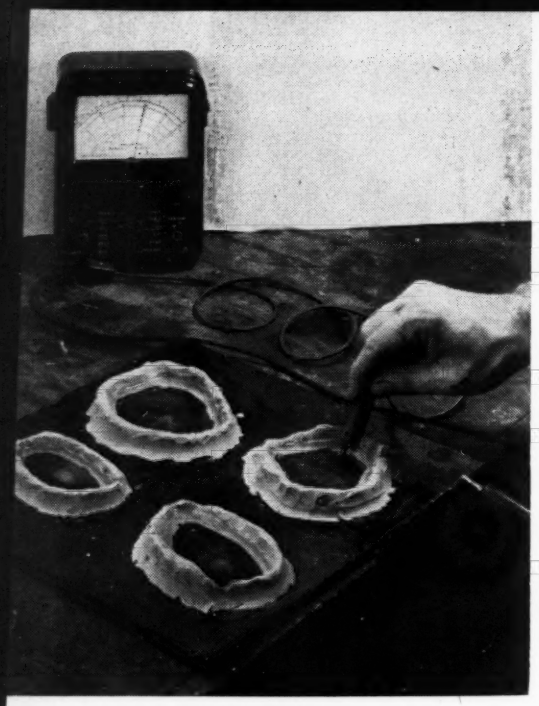


Fig. 6. Electrical resistance test. Clay dams are filled with sulfuric acid and allowed to stand for 14 days prior to test. No failure occurred in the glass mat reinforced enamel during this period.

by obtaining the pressure drop across the mat when a given air velocity is applied. This value serves to indicate how readily the mat will be saturated by the coal tar enamel upon application.

Moisture absorption is measured by first exposing the sample to 95% relative humidity at 120° F and then weighing the sample before and after drying. This test is made to determine whether glass mats will pick up enough moisture during storage and handling to cause difficulty during application. No sample to date has been known to pick up more than 0.5% moisture.

Weight and ignition test

Another test measures weight and ignition loss to make sure that the weight of glass and binder are in the correct proportion to do the most satisfactory job of reinforcing coal tar enamels.

In application, the mat is wrapped on a cleaned and primed pipe after first applying a coating of pipeline enamel. The glass mat is wrapped into the enamel while the enamel is still fluid enough to embed itself in the glass mat. Benefits are derived from this application of glass wrap during both application and service life. The very small glass fibers act to break and eliminate blisters and bubbles and create a jell structure that tends to hold the hot coating in place. This decreases run-off losses and gives a more uniform coating thickness.

Impact resistance

One service benefit is increased impact resistance to such a degree that damage to the enamel is limited to the area immediately beneath the point of impact; there is no cracking or shattering of the enamel over a wide area of the pipe. Laboratory tests conducted as shown in *Fig. 1* indicate that glass mat reinforcement alone improves impact resistance about 300%. In this test, a 12x12x¼-in. steel plate is cleaned, primed, coated, and the coating reinforced in accordance with accepted pipe wrap procedure. This plate is then placed at a 15° angle with the horizontal and a 13.2-lb metal cylinder, 2 in. in diameter, is dropped on it. Failure at point of impact is determined by a 20,000-volt probe. The height of drop may be varied and thus the foot pounds of energy required to cause failure may be computed. Because this is a relative test, all samples are compared with non-reinforced enamel.

Heat sag decrease

Another service benefit derived from the use of glass mats is a decrease in the heat sag of the pipeline enamel, which contributes to a more uniform coating. Heat sag may occur either immediately after the coating is applied or while the pipe is standing in the hot sun prior to being lowered into the ditch. Increased heat sag resistance can be proved in the field by measuring the thickness of the enamel at the top and bottom of the pipe or in the laboratory by a sag test. In this test, one plate is coated with enamel only and the second plate is coated and reinforced with glass mat pipe wrap. In both cases, parallel lines are scribed across the surface of the finished coating. The test plates are then placed in an oven at a temperature of 180° F for a period of 24 hours. The results are shown in *Figs. 2* and *3*. O

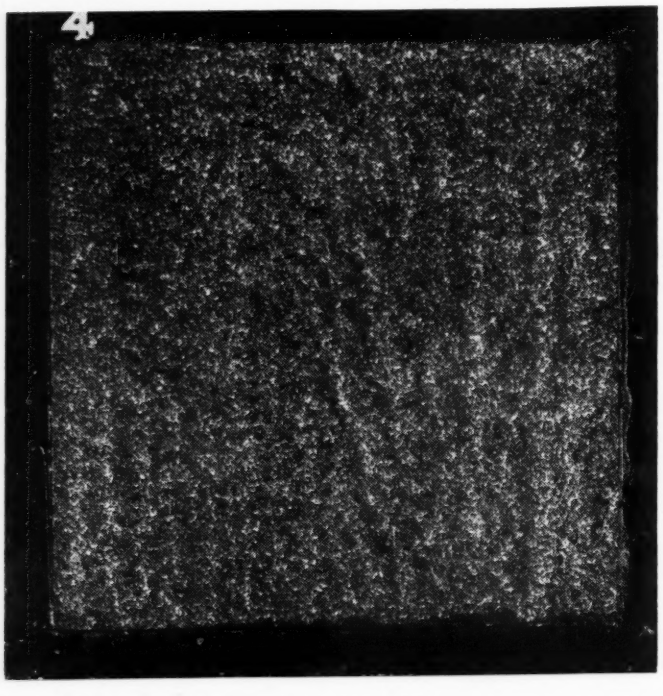


Fig. 7. Enamel protected by fibrous glass base outer wrap prior to soil stress test.

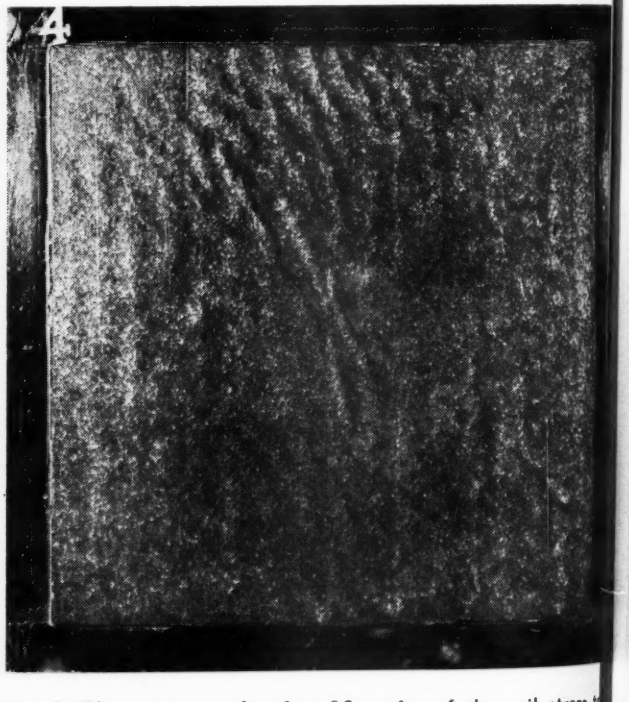
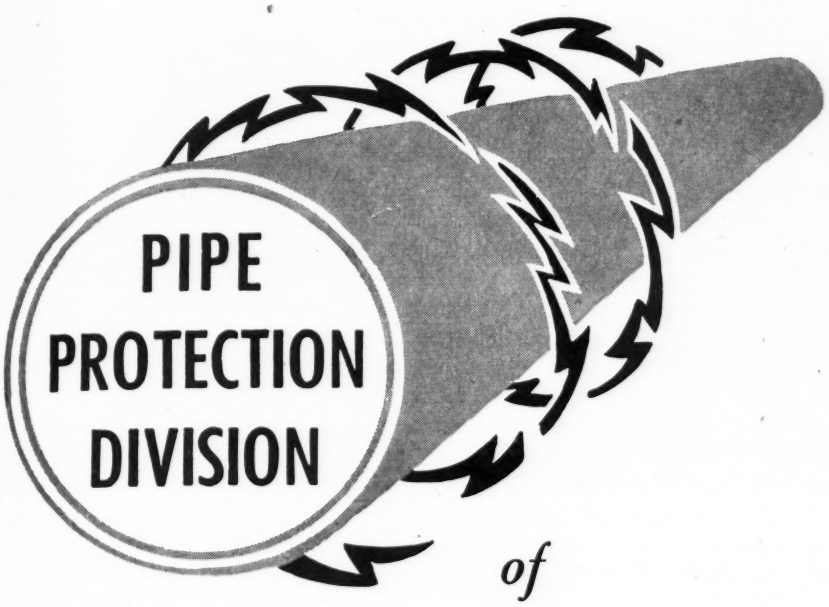


Fig. 8. The same sample after 10 cycles of the soil stress te The sample passed the 20,000 volt electrical test after 25 cyc



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the un-reinforced enamel the parallel lines have disappeared while the lines have remained very nearly parallel on the reinforced enamel plate.

Soil stress resistance

Increased soil stress resistance is another important benefit derived from the use of fibrous glass pipe wrap materials. In testing this resistance, test specimens are fabricated on 12x12-in. steel plates to simulate an actual pipeline coating. The enamel is applied in a thickness of 3/32 in. and may be reinforced or protected if desired. A mud mixture consisting of 76% (by weight) Houston, Texas, gumbo clay and 24% water is mixed by hand to a smooth paste-like consistency and placed on the approximate 6x6-in. center of the 12x12-in. test sample to a depth of 1 in. The samples are then placed in an oven at 100° F and allowed to dry. This completes one cycle. After each cycle the coating is tested with a 20,000-volt electric probe to determine whether failure has occurred.

Before and after photographs of such a test are shown in *Figs. 4* and *5*. A typical set of results indicates the failure of an un-reinforced pipeline enamel after one cycle and no failure of a glass reinforced enamel after 18 cycles, at which time the test was discontinued.

From time to time it has been asserted that fibers of glass imbedded in a pipeline enamel coating will wick moisture from the soil to the surface of the steel pipe. This contention has been disproved by the test pictured in *Fig. 6*. Cleaned and primed steel plates coated with enamel reinforced with glass mat are subjected to sulfuric acid held in place by clay dams. Failure is determined by a 20,000-volt electric probe. No failure occurred during 14 days of continuous exposure to the acid.

A second fibrous glass base product used as an outer wrap in underground pipeline protection work is a bitumen saturated fibrous glass mat identical with the one used to reinforce coal tar enamels. Tests used to determine the application and service benefits of this product are similar to those used for testing glass mats.

Drop impact tests identical with those described earlier for glass mats indicate that the outer wrap alone increases the impact resistance of coal tar enamels as much as 500% depending upon the nature of the enamel used. It is significant that all enamels tested in conjunction with an outer wrap had increased to very nearly identical impact resistance regardless of the type of enamel, while unprotected samples of these same enamels showed impact resistance of greatly varying degrees. A second advantage of the glass-base outer wrap is its porosity, which permits the escape of gases that might otherwise cause holidays, and also permits keying of the outer wrap to the enamel by permitting enamel to penetrate into the outer wrap.

Successful tests

Soil stress tests conducted on primed steel plates having a coating of coal tar enamel and one layer of glass mat base outer wrap have successfully undergone 25 complete cycles without failure (*Figs. 7* and *8*). Even though, at times, the outer wrap saturant and glass fibers have been removed down to the parallel strands in the glass base mat, no holidays have been detected by the use of a 20,000-volt probe.

Meanwhile, testing and development of these products is going on and continued progress is being made toward an even better fibrous glass mat.

This article has been adapted from a talk presented at a recent meeting of the Tulsa Pipeliners Club.

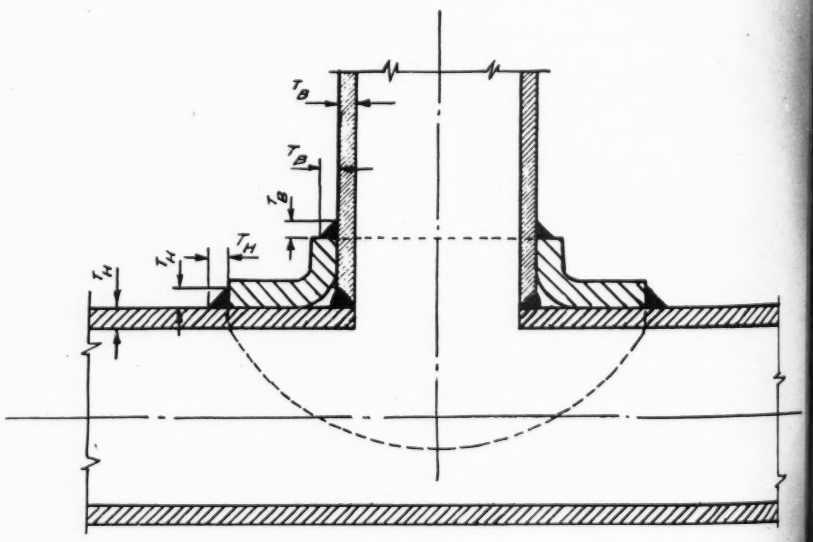
Welding and reinforcing branch connections

In spite of the advancement of pipeline welding in the last decade, there are still many welding problems that remain unsolved. Numerous committees have been formed recently to attempt to overcome some of these difficulties and much research has been done on fabrication methods pertinent to joint design, type of reinforcing to be used for reinforcing branch connections, etc.

As a result of the findings of these groups, Northern Natural Gas Co. has recently changed its welding practices followed in the welding of reinforcing saddles. The accompanying sketch illustrates the new procedure; the theory being that the smaller weld will lessen stress accumulations in critical areas of both the branch and header.

Formerly, the company applied a full fillet weld on all saddle reinforcings. Because the neck of a reinforcing saddle tapers to a lesser thickness than that of the skirt of the saddle, it is obvious that in some instances a full fillet weld may still apply to the neck weld. Other than that, the thickness of the header or branch pipe will govern the size of the fillet weld to be applied.

In fitting the branch to the header, the hole is cut to the inside dimension of the branch pipe. The branch pipe is beveled to approximately 30° to provide for thorough penetration with the stringer bead or first pass. This method of installation requires a smaller weld and thus there is less distortion so, until better branch connection joints are proven, the company will continue to use this method.



New procedure used by Northern Natural for welding reinforcing saddles. T_B is the wall thickness of the pipe used on branch and T_H is the wall thickness of pipe to be used on header.

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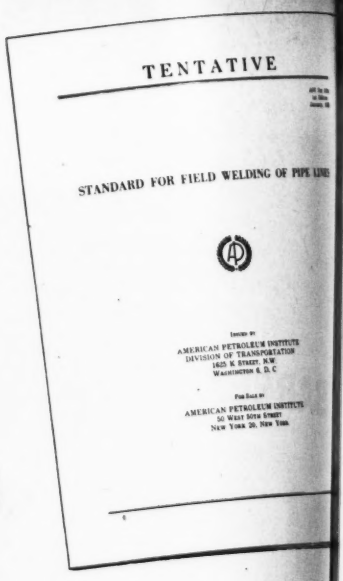
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Joint AGA-API committee completes new welding standard

THE natural gas and oil pipeline companies, and the contractors who do their construction work for them, at last have a standard guide of welding operation. In January, American Petroleum Institute published its brand new "Tentative Standard for Field Welding of Pipelines," which sets up specifications covering methods, prime materials, equipment, welding procedures and techniques, and radiographic and other inspection practices.

The culmination of more than three years work and study, the standard is the product of a joint AGA-API committee headed by R. G. Strong, Natural Gas Pipeline Co. of America, bringing together representatives from not only the two associations, but also the Pipe Line Contractors Assn., National Electric Manufacturers Assn., pipe manufacturers, and research bodies. It passed through five revisions before all sponsors felt it was ready for publication.

The standard is practicable and workable, according to Mr. Strong. Even before it was finally polished into its present form, it was adopted by a number of companies as a working model. It had unqualified approval of a great majority of the 200 persons who reviewed it and voted on it. It was developed "to assure uniform construction practices and to simplify the technique," and was based on a review of most of the working specifications used by the major pipeline companies of both the oil and gas industries.

Reviewing high points of the standard*, Mr. Strong said:

"The committee particularly prescribed the handling and maintenance of equipment so as to assure proper performance at all times. The handling of materials, particularly weld rod, was prescribed to maintain top quality and reduce waste caused by weather or field conditions. Since the committee was composed of members of the various interested organizations, all angles in the handling of equipment and materials could be given serious and authoritative consideration to minimize damage without causing undue hardship to any one of the parties because of unsound demands. The specification as written permits reasonable progress in all kinds of terrain and weather conditions.

"Although the specification does not require a formal welding procedure qualification record, it very definitely outlines the entire procedure for welding, including requirements for welding bevels, supports, actual welding speeds and practices, number of beads and other factors necessary for the production of sound welds. Again the specification does not set up a formal welder's qualification, but it has prescribed a sufficiently stringent qualification control to prove the professional experience of each welder so tested. The qualification requirements are written in such a manner as to permit the various companies to satisfy their individual requirements without changing the intent of this specification. The committee recognized the fact that certain conditions may impose an adverse hardship on the welder being tested and, therefore, included a clause allowing for a certain amount of retesting, where such retesting appears to be advisable.

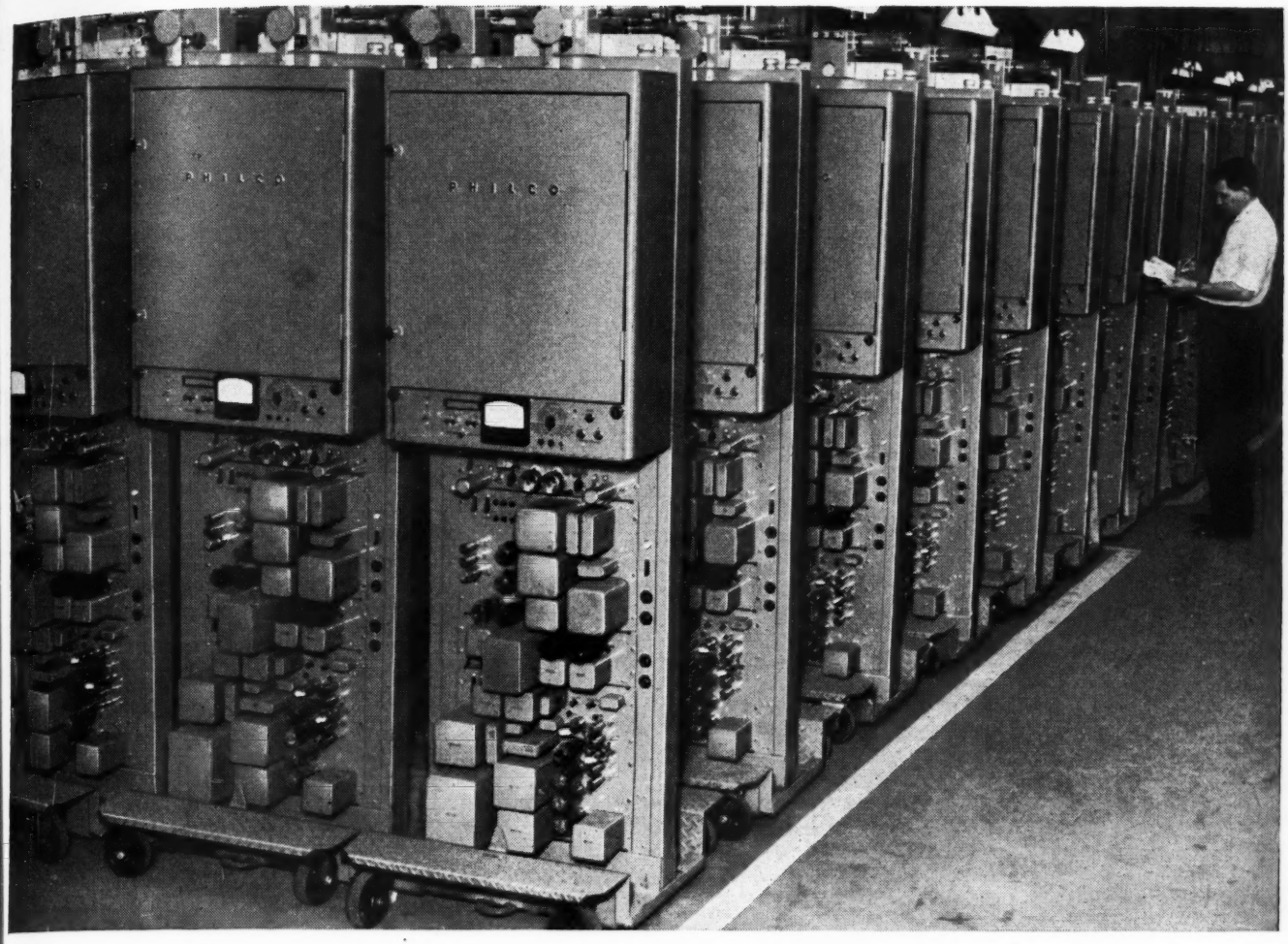
"The committee on radiographic examination has made every effort to eliminate discriminatory requirements for either X-ray or gamma-ray application, although at times considerable difficulty occurred because of differentials that might lead to discrimination. Such details were worked out in the hope that there would be no serious conflict between these two methods of radiographic inspection.

"By setting the radiographic technique requirements the committee felt that the radiographs could be more readily interpreted, eliminating any false interpretations that might cause unnecessary repairs.

"In writing this specification the committee recognized the fact that the owner company and its representatives should at all times hold paramount place in the construction program. Every attempt was made to write the specification in such a way that its application would not hinder or remove the authority from the owner company or its representatives.

"The committee also recognized the contractor's position and believes that this specification will be to the best interest of both the contractor and the owner company. The committee further realizes the rapid developments that are taking place in both welding and testing and has given consideration to possible expansion to include such items as automatic welding, preheating, non-destructive testing other than radiography, etc., but feels that at this time none of these items have advanced to a point in cross-country construction where more than recognition could be afforded them. As these items are improved and after sufficient field experience has been gained such items will be further considered for inclusion in the specification."

*Before the annual meeting of the Pipe Line Contractors Assn. in Houston, Jan. 19-21.



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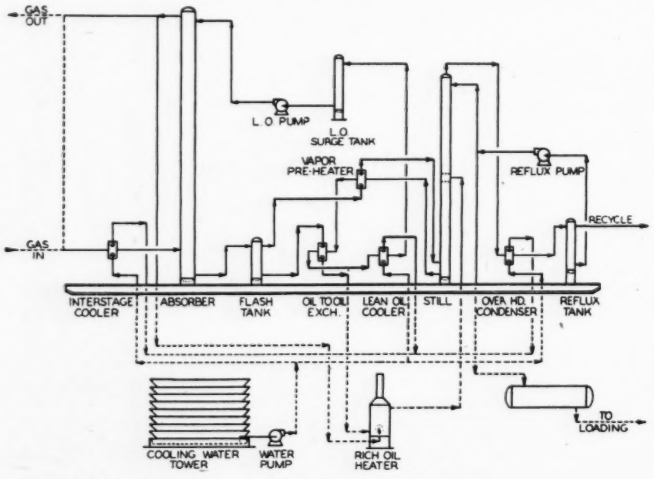

Fig. 1. Schematic flow diagram of a standard Type W absorption and distillation packaged gasoline plant. This plant recovers an unstabilized gasoline.

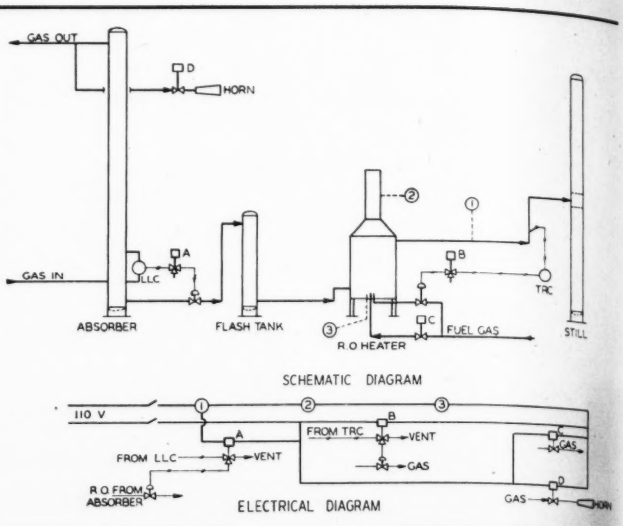

Fig. 3. Safety shutdown system used in the Type W plant. In the event of failure, the safety valves automatically open or close, whichever is desirable. (Fig. 2 appears on p. 116.)

Conserving natural gas with packaged gasoline plants

By **GUINN T. WILLIAMSON** • Blaw-Knox Construction Co., Tulsa

The emphasis in late years upon conservation has brought about the development of techniques and apparatus for recovering hydrocarbons that might otherwise be lost; one of the most effective types of equipment for achieving this purpose is the so-called "packaged" plant that may be utilized for short periods in one location, then feasibly removed to another site for another short-lived job.

Packaged (or portable, or skid mounted) compressor plants were recently described in a *GAS* article ("New Designs for Portable Compressor Plants," by D. E. Michael, January 1953, pp. 97-99). Articles in this and other journals have described other types of packaged plants that broaden the scope of economic operations in hydrocarbon delivery.

The portable gasoline plants discussed here, while they are not completely transportable as preassembled units, are nonetheless, standard, easily dismantled units. They can play several important roles in conservation.

They may be used to reduce the heavy hydrocarbon content of flared gas.

They may make flared separator gas suitable for utility use.

They may be economically installed in a short-lived field, making saleable small volumes of gas for local utility use through removal of condensible hydrocarbons.

They may be used in new fields to obtain an advantageous gas contract position and a source of revenue while additional drilling is being carried on to determine the extent of the field.

The author is project engineer for Blaw-Knox Construction Co., in Tulsa. This article was developed from a talk that he gave at the winter meeting of the Interstate Oil Compact Commission in Wichita.

A SCHEMATIC flow diagram of a standard Type W unit that recovers an unstabilized gasoline is shown in *Fig. 1*. Wet gas enters the base of the absorber and rises upward countercurrent to the absorption of oil, which absorbs the gasoline components from the gas. The residue gas then passes through a mist eliminator and then into the sales line. Rich oil from the base of the absorber is reduced in pressure at the flash tank to permit sufficient stripping vapors to be flashed for the still.

The rich oil is then preheated in the oil exchanger before entering the rich oil heater where the temperature is raised to approximately 500°F. The stream enters the midsection of the still and the vaporized portion of the rich oil plus the stripped vapors from the lower section rise upward through the column, which is refluxed with gasoline to condense vaporized lean oil. The liquid part of the feed stream, plus condensed lean oil from the upper section, travels down the column to be further stripped by ascending vapors from the flash tank. Overhead vapors are condensed and flow to the reflux tank, from which the reflux pump takes suction. A controlled part of the discharge is used as reflux to the still and the remaining liquid flows to the product storage tank. The uncondensed vapors from the reflux tank and vapors from the storage tank are recycled to the absorber. Hot lean oil from the base of the still is used as a heating medium for flashed vapors and the rich oil stream before being cooled in the lean oil cool

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This quality-controlled enamel will heat up faster, flow better from kettle to pipe and coat more pipe per ton over a wide temperature range. And remember this: *Pitt Chem's uniform top quality means better, longer-lasting protection underground.* ● Write today for more product data, technical information or on-the-spot application assistance.

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TABLE 1. Approximate Performance and Utility Requirement

A. Approximate Operating Conditions:

	Psig	°F
Absorber inlet	220	90
Lean oil		90
Rich oil heater outlet		500
Still top		205
Still bottom	40	460
Still reflux tank	35	100
Gas volume Mcf/day containing 2380 gal./day pentane plus		5000
Oil circulation gpm - 180 mw lo -		25
Gasoline production 34 lbs rvp		2450
Residue sales volume Mcf/day		4930

B. Utility Requirements:

Power for pumps	9.2 kw
Plant lighting	3.0 kw
Fuel for heater Mcf/day	39.0
Cooling tower make up bbl/day	100
Recycle comp. power bhp	23.4

er. It then flows to the surge tank from which the lean oil pump takes suction. The discharged lean oil then enters the top of the absorber to complete the cycle.

Water eliminated

Steam generating facilities are not required in the plant. Dry stripping is employed by using vapors from the flash tank. This system eliminates water from the process, which, in turn, eliminates possible corrosion. It also eliminates the investment in steam generation equipment and frequently eliminates the need for dehydration facilities. Instruments are operated by dry residue gas, thus eliminating the need for instrument air compression equipment.

Fig. 2 is a flow diagram of the control system for a Type W plant. Safe and sufficient instruments are incorporated in this unit to insure maximum efficiency as well as safety for the equipment and personnel. The controls are conventional and are selected for simple operation with little maintenance. Reflux to the still is regulated by a temperature controller that permits holding a desired end-point specification. Pressure in the still is held by a back pressure controller on the reflux tank vapor line. Temperature in the reflux tank is controlled by a regulator that bypasses overhead vapors around the condenser. The controlling instruments are fully automatic, permitting the operator to have time for other duties.

Automatic safety

One of the features of this plant is an automatic safety shutdown system shown in *Fig. 3*. It performs the following functions:

1. With a low pressure of 15 psig or less in the heater outlet, fuel gas to the heater burner is cut off and rich oil from the absorber is stopped.

2. If the stack temperature reaches 1250F°, the fuel gas is cut off and rich oil continues to flow.

3. Flame failure at the burner cuts off the fuel gas and the rich oil continues to flow.

4. Power failure permits the continued flow of rich oil and cuts off the fuel gas.

When any of the above failures occur, the system will "fail safe," i.e., the valves will be open or closed, whichever is desirable. With any failure, a horn is sounded to warn the operator and the system must then be manually reset before the plant can be put in operation again.

The installation of a Type W plant requires four supporting foundations, one each for the main skid, gasoline storage tank, rich oil heater, and the water cooling tower. The main skid is fabricated from structural steel and is approximately 8 ft wide and 30 ft long. Mounted on the skid are all items of equipment except those noted above, including preassembly of pipe, valves, fittings, exchanger equipment, pumps, pressure vessels, and control equipment. This is shown schematically in *Fig. 1*. The dashed lines indicate piping to be fabricated at the plant site by the purchaser. Because of the heights of the absorber and still, they must be dismantled before shipment and their respective piping is match-marked for easy reassembly at the plant site. Pressure vessels are fabricated in accordance with the API-ASME code. Heat exchange equipment is purchased within TEMA and ASME codes and the piping is designed in accordance with the ASA code.

Approximate performance

Table 1 is an outline of approximate performance and utility requirements. As can be seen, these data are based on a plant processing 5 million scf/d of inlet gas with an absorption oil circulation of 25 gpm. The product in this case is a 34-lb rvp gasoline. The electrical requirements are for motor-driven pumps and for plant lighting. The recycle compressor is for boosting the still reflux vapors up to the absorber pressure. When

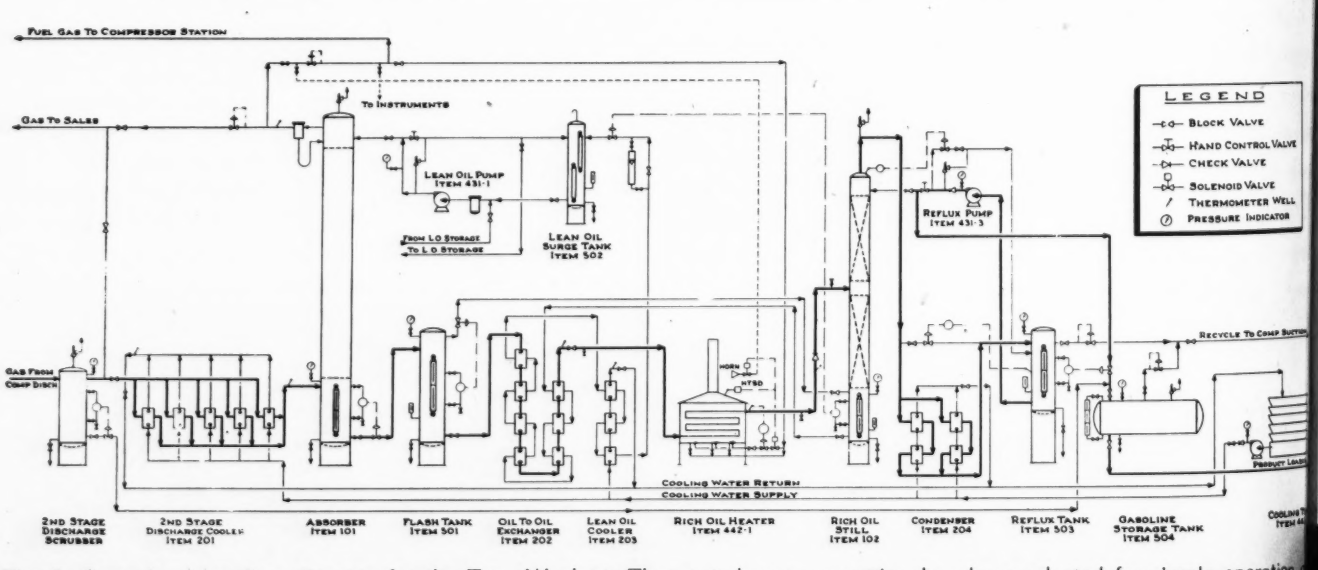

Fig. 2. Central system flow diagram for the Type W plant. The controls are conventional and are selected for simple operation with minimum maintenance.

PRICE PIPELINE PORTRAITS

R. L. "BOB" EZELL, Superintendent, Spread 2

Typical of the experienced pipeliners that command H. C. Price Co.'s construction operations is Bob Ezell, a veteran of twenty-three years with the company. After serving as a welding foreman for a number of years, Ezell was promoted to the position of spread superintendent in 1952 - providing HCPCO with a qualified and highly-regarded pipeliner for this important assignment. Recently honored for leading his gang to an outstanding safety record, Bob has earned the respect and admiration of every pipeliner with whom he has worked. H. C. Price Co. is proud of its construction crews and their leaders . . . they assure the quality of workmanship and dependability that have made HCPCO "America's Foremost Pipeline Constructors."

PIPELINE PRICE CONSTRUCTORS

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electricity is not available, it is practical to install a hydraulic system that is powered by a gas engine driving an oil pump, which, in turn, drives hydraulic motors on the individual pumps.

As an alternative, reciprocating steam pumps may be used by expanding residue gas through the steam end of the pump. This is a more simple type of arrangement than the hydraulic system but consideration must be given to the size of such pumps since space is an important factor in the arrangement of equipment on the main skid.

Operation of this unit requires but one man. He can be an engine operator or a lease man since the automatic control and safety shutdown system permit him to have time for duties other than operating. If a lease house is available, at the plant site, one operator can be responsible for the plant 24 hours per day. Some producers, however, prefer to have one man for each 8-hr shift, in order to keep efficiency as high as possible.

For a plant with operating conditions as outlined in *Table 1*, the approximate cost at point of preassembly is $50,000. It is estimated that the field work and materials as mentioned herein, will cost approximately $7500 based on sub-contract and retail rates. Where existing company labor is available, the estimated field labor costs can often be reduced. This investment of $57,500 does not include any compression equipment, field gathering systems, or tie-in to residue gas lines.

A fractionation unit (modified Type W unit) can also be used in conjunction with the standard Type W unit to recover a stabilized gasoline as well as an LPG product. Another unit, designed for higher recovery of both LPG and stabilized grade gasoline than the modified Type W unit, is known as the Type S unit.

References

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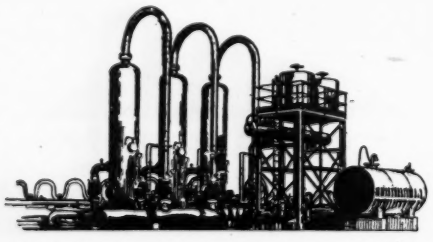


Thomas is new president of Pipeline Contractors Assn.

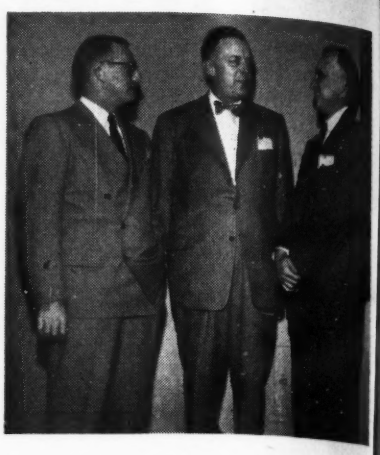
Robert Thomas, Texas-Louisiana Contractors, Ft. Worth, Texas, has succeeded Robert A. Conyes, Conyes Construction Co., San Pablo, Calif., as new president of the Pipeline Contractors Assn.

Other news officers elected at the 5th annual convention and exhibit of that group in Houston recently include James P. Neill, Western Pipeline Construction Inc., Austin, Texas, vice president; C. C. Bledsoe, Midwestern Constructors Inc., Tulsa, treasurer; and Richard A. Gump, Dallas, executive secretary.

Directors elected are Earl Allen, Associated Pipe Line Contractors Inc., Houston; G. A. Manuel, Williams-Austin Co., Pittsburgh; J. C. Britton, Britton Contracting Co. Inc., Washington, Pa.; T. A. Hester, Oklahoma Pipe Line Constructors, Dallas; R. H. Fulton, R. H. Fulton & Co., Lubbock, Texas; W. E. Honey, Latex Construction Co., Atlanta; Robert D. Sheehan, Sheehan Pipe Line Construction Co., Tulsa; R. P. Gregory, Houston (Texas) Contracting Co.; Felix M. Johnson, Trojan Construction Co. Inc., Oklahoma City; Richard A. Gump; and C. C. Bledsoe.

Charles A. Lingo, vice president, Tennessee Gas Transmission Co., Houston, submitted to members a list of 10 don'ts to reduce the number and nature of complaints made by landowners against pipeline transmission companies crossing their properties and outlined the following rules:

Complete the cleanup and rebuild the fences in the presence of the landowner or his representative, in order that any suggestion or complaint that he may have can be handled at that time.



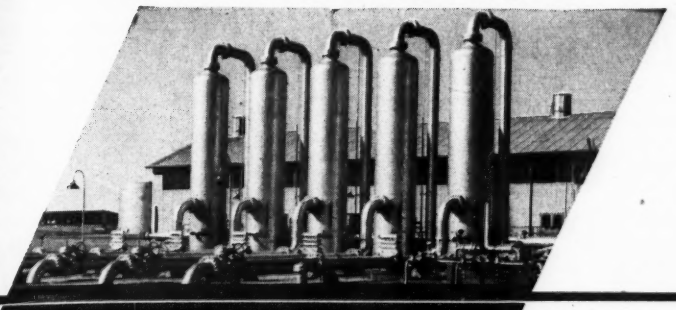
New officers of the Pipeline Contractors Assn. (left to right) are James P. Neill, vice president; Robert Thomas, president; and C. C. Bledsoe, treasurer.

Leave the premises in as neat a condition as is possible and fences in a state of repair as good, if not better, than they were when you entered.

Restore private roads you might have used; repair bridges or culverts your heavy equipment might have damaged. Do these things immediately after back-filling the ditch in order that the landowner may resume his operation that might have been halted by the presence of your work.

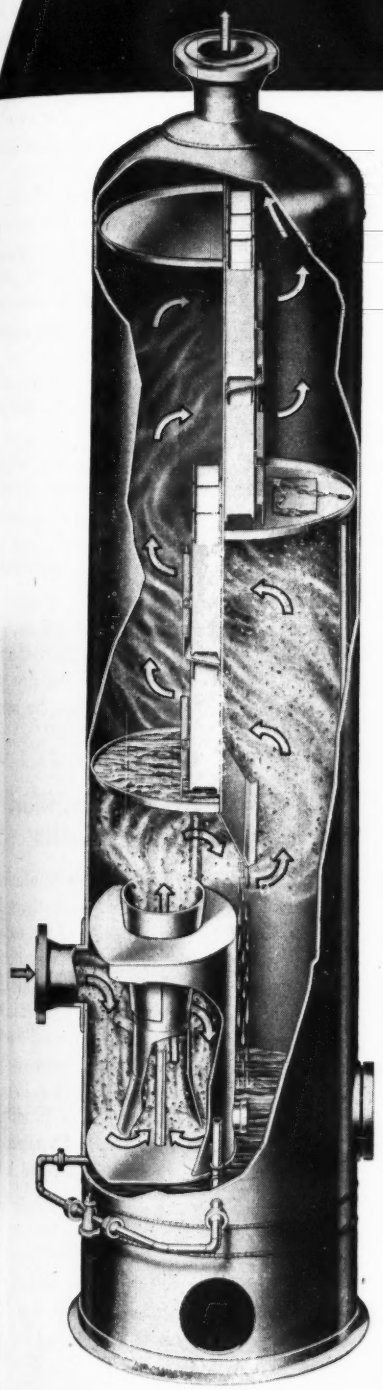
Carl Lavery, Houston Contracting Co.; Bennie G. Pierce, H. C. Price Co.; and Donald Graham, Associated Pipeline Contractors, participated in a panel discussion on "Safety in Pipeline Construction." Mr. Lavery, who presided over the panel, touched on workmen's compensation; Mr. Pierce on the control of automobile and bus accidents, and Mr. Graham on general public liability.

Among the speakers at the convention were (standing left to right) Bennie G. Pierce, H. C. Price Co.; Donald Graham, Associated Pipeline Contractors; and Carl Lavery, Houston Contracting Co., who participated in a panel discussion on "Safety in Pipeline Construction." Seated (left to right) are Richard Gump, executive secretary of the association; Walter Davidson of Transcontinental Gas Pipeline Corp. who discussed the proposed ASA code for pressure piping; and Robert Thomas, new president.



No Slugging of Compressors ... with **FLUOR** *Gas Cleaners*

On guard!



This is the Fluor Model DV Gas Cleaner, an oil-injection type scrubber for removing dust from dirt-laden gas. It is known for its superb cleaning efficiency, non-slugging characteristics, rugged qualities, and its fine balance between the oil-injection rate and the extraction ability of the elements and "drop out" areas.

The dust particles in gas passing through a Venturi-type oil spray chamber are thoroughly wetted, regardless of the quantity, pressure and temperature of the gas in the line. There are no moving parts or special mechanisms — the rate of flow of gas through the cleaner automatically determines the quantity of oil that is aspirated with the gas. Because of the variations in suction pressure common to gas transmission service, the gas cleaner is designed to operate through a broad pressure range at full capacity.

Three expansion areas and two mist-extracting elements remove the remaining liquid so effectively that Fluor guarantees a carry-over not to exceed .05 gallon per million standard cubic feet of gas. Reliable tests on a well-known gas line found carry-over of Fluor DV Gas Cleaners less than .01 gal./mmscf.

FLUOR LIQUID REMOVAL GAS CLEANERS

Utilizing the same principles as Model DV, Fluor liquid removal Gas Cleaners possess an exceptional ability to extract liquids through the whole range of operating conditions. Performance of these cleaners is accurately predicted on special nomographs, a new rating system exclusive with Fluor. For full details contact your nearest Fluor office or write for Bulletin GC-0.001.

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PIPELINE NEWS

El Paso plans increased deliveries to California

Applications requesting authority to construct pipeline facilities estimated to cost $199,714,045 have been filed with FPC by El Paso Natural Gas Co.; Pacific Gas & Electric Co., San Francisco; and Southern California Gas Co. and Southern Counties Gas Co., Los Angeles. The proposed additions would allow the California companies to accept delivery of an additional 300 MMcf daily, which El Paso would transport from the San Juan and Permian basins, and provide an additional 100 MMcf per day to El Paso's customers in west Texas, New Mexico, and Arizona.

El Paso Natural proposes to construct, at a cost of about $175,250,000, a total of 1778 miles of pipeline—including 750 miles of 30-in. and 70 miles of 24-in. plus gathering lines—and 157,000 hp compressor capacity. The facilities would permit the delivery of an additional 300 MMcf of gas daily from the Permian basin in southeast New Mexico and west Texas, and an additional 100 MMcf from the San Juan basin in northwest New Mexico and southwest Colorado. Of the 300 MMcf from the Permian basin, 100 MMcf would be delivered to the two southern California companies and 100 MMcf to PG&E, while the remaining 100 MMcf would serve El Paso's customers in Texas, New Mexico, and Arizona. The 100 MMcf from the San Juan basin would be equally divided between the northern and southern California customers.

Pacific Gas & Electric Co. proposes to build about 170 miles of 34-in. mainline loops and add 15,000 hp to its compressor capacity to increase its deliverability by nearly 152 MMcf daily. The looping would be made on its line between Topock, Ariz., where it takes delivery from El Paso, and a point near Milpitas, Calif. The company also proposes to supplement its service to the Bakersfield, Calif. area, and construct an 8-mile line between Milpitas and Irvington, Calif. Estimated cost of the project is $26,981,851.

The two southern California companies, Southern California and Southern Counties Gas Co.'s, plan to build 73 miles of 30-in. mainline loops and add 5280 hp compressor capacity on their line extending from a connection with the El Paso system near Blythe to a point near Santa Fe Springs, Calif. The proposed facilities, which would increase the system's capacity by 151.7 MMcf, are estimated to cost $7,482,194.

Offshore fire finally brought under control

The offshore gas well fire that burned wildly for almost two weeks was finally brought under control last month.

Professional fire-fighters Mansel Rake and his boss Myron Kinley of Houston managed to cap the wells, ending the struggle that began when one well exploded and burst into flames on Jan. 25. The second well caught fire the next day.

After the blaze had been extinguished by a dynamite blast, valve fittings were slipped over the ends of the weakened pipes to shut off the flow.

The two wells, the property of Pure Oil Co., are located 10 miles off the Louisiana coast, in the Gulf of Mexico.

Northern and Permian file revised applications

Permian Basin Pipeline Co. and Northern Natural Gas Co., Omaha, have submitted revised plans to FPC for their proposed system to transport 300 MMcf of gas per day from gas fields in Upton county, Texas, and Lea county, N. M., to Northern's system. The amended applications would reduce the amount of construction and the cost of both projects, but provide for delivery of the same volumes of gas as originally proposed.

Permian now plans to construct 163 miles of pipeline and 66,000 hp in compressor units in Texas and New Mexico at a cost of about $40,269,000. The application eliminates construction of approximately 24 miles of line from Lea county, N. M., to a connection with Northern in Carson county, Texas, which was proposed in the original application. Permian will deliver its entire volume of gas to El Paso Natural Gas Co. at a connection in Yoakum county, Texas, and El Paso will then deliver it back to Permian at a point in Moore county. Permian will deliver this gas to Northern in Dumas, Texas.

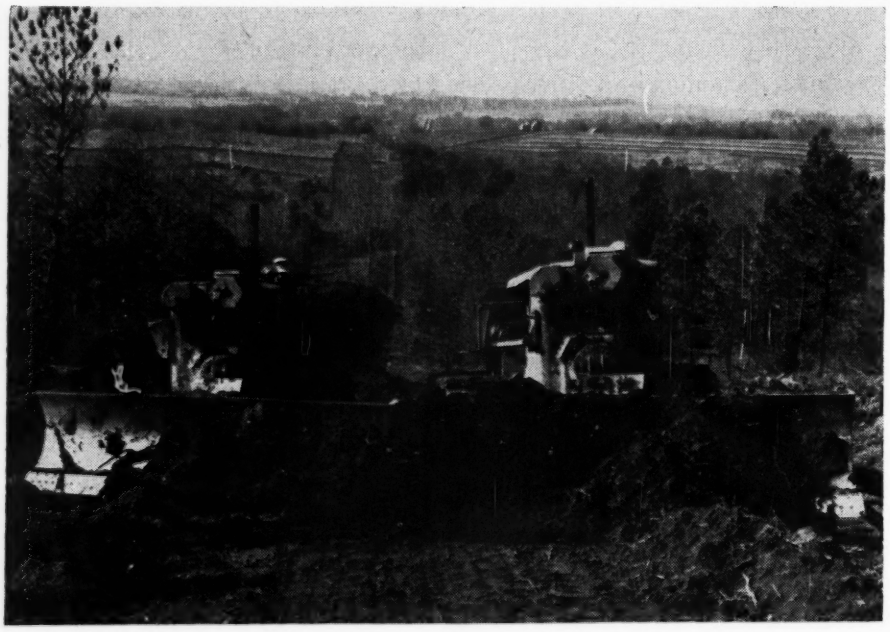
Northern's amended application includes the proposed construction of about 425 miles of mainline and 62,400 hp in compressor capacity with numerous branch lines and branch line additions. Estimated cost is about $66,248,000.

Both projects are to be carried out over a period of two years with 200 MMcf of gas per day to be delivered the first year and the full 300 MMcf daily, the second year.

FPC okays $174 million outlays in six months

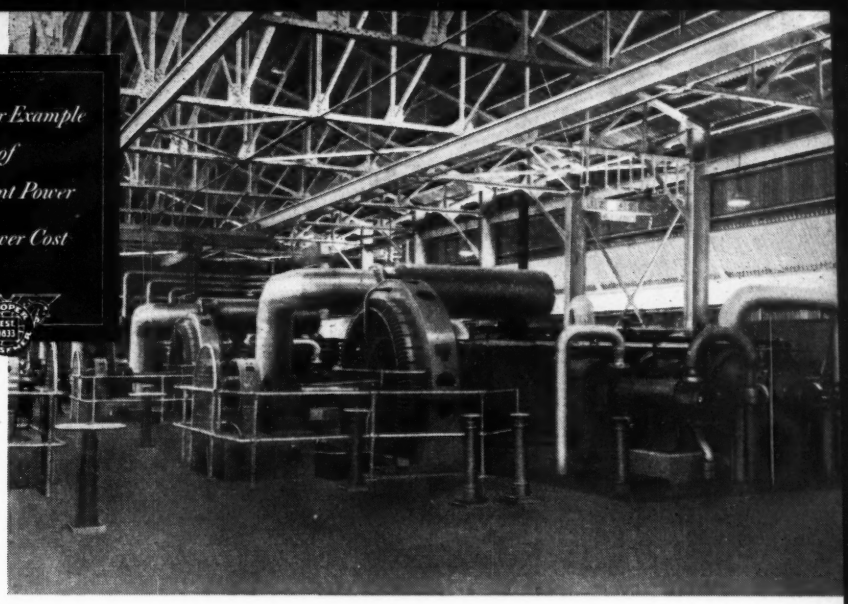
Construction of natural gas transmission facilities designed to add more than [illegible] billion cu ft of daily capacity to the nation's individual pipeline systems was authorized by FPC during the last six months of [illegible]. The new facilities include 2232 miles of pipeline, 139,205 hp in compressor stations and other facilities, at a total estimated cost of $174,055,234. Most of this was in [illegible] projects that will bring gas to 78 cities of 50,000 or more population in 17 states. The construction authorized was covered by certificates.

The largest single project authorized during the half-year period was for Texas Transmission Corp., Owensboro, Ky., to construct 408 miles of 26-in. loop line on its mainline system between Louisiana and Kentucky. The project also included 26,86[illegible]



A pair of huge bulldozers clear right of way for H. C. Price Co.'s Spread-Four, laying section of 24-in. line for Southern Natural Gas Co. as work proceeds on project looping its transmission line from Mississippi to Georgia.

Another Example of Efficient Power at Lower Cost



Cooper-Bessemer

MODERN DESIGN...

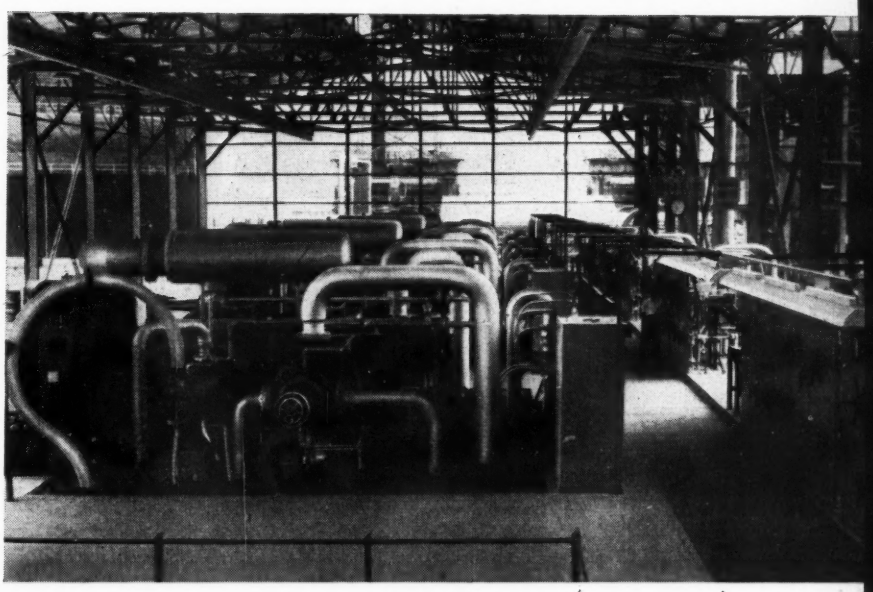
for compressors at Sindri . . . at Suez . . . everywhere!

Shown opposite are Cooper-Bessemer motor-driven compressors in two of the world's newest and largest synthetic ammonia plants.

The top view shows part of the 22,000 Cooper-Bessemer M-Line compressor horsepower installed in the ammonia synthesis plant of the Sindri Fertilizer Factory, Bihar Province, India. Here, ammonium sulphate can be produced at a rate of 1,000 tons a day—350,000 tons a year!

Similarly the other photo shows a line-up of Cooper-Bessemer compressors in the large Suez plant of the Societe Egyptienne D'Engrais et D'Industries (S.A.E.), Egypt. Here, calcium nitrate fertilizer is produced at a rate of 200,000 tons yearly.

In both plants, these modern Cooper-Bessemer units handle the entire compressing job and comprise the heart of production operations. For, with Cooper-Bessemers, you can be sure of year-in, year-out performance at the lowest operating cost.



Cooper-Bessemer M-Line motor-driven compressor in the synthesis section of the Sindri Fertilizer Factory, India. Here eight 2,750 hp 7-cylinder units compress gas through six stages to a pressure of 5,500 psi. The huge Sindri plant was engineered by the Chemical Construction Corp., New York, and built under the direction and supervision of the Power-Gas Corp., Ltd., England.

Here, in the Suez plant of the Societe Egyptienne D'Engrais et D'Industries (S.A.E.), these four 2,750 hp JM-5 motor-driven units compress 25,344 mcf of gas daily from atmospheric to 5,200 psi for initial calcium nitrate production of 200,000 tons yearly. This plant, engineered by the Chemical Construction Corp., utilizes waste gases from nearby oil refineries.

The Cooper-Bessemer Corporation

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HOT DOPE

Straight from the Kettle on PIPE PROTECTION

★

By Boyd Mayes

● We landed a job the other day that sort of got us thinking. Half dozen joints of used 2″ to be cleaned, coated and wrapped. First, though, we had to straighten the kinks out and bevel the ends. It was pretty much the worse for wear. But it got the same precision workmanship that a hundred miles of big inch would get in our plant. And, we didn't have to bid on this one. It just rolled in. What got us thinking was that some yards that have up "Cleaning—Coating—Wrapping" signs might have thrown this little one back. We've coated, wrapped and reconditioned more than 300 million feet of pipe in our day, and we've never turned down a little trouble job for a customer yet. They're a part of our 25 years of continuous service to the Pipe Line Industry.

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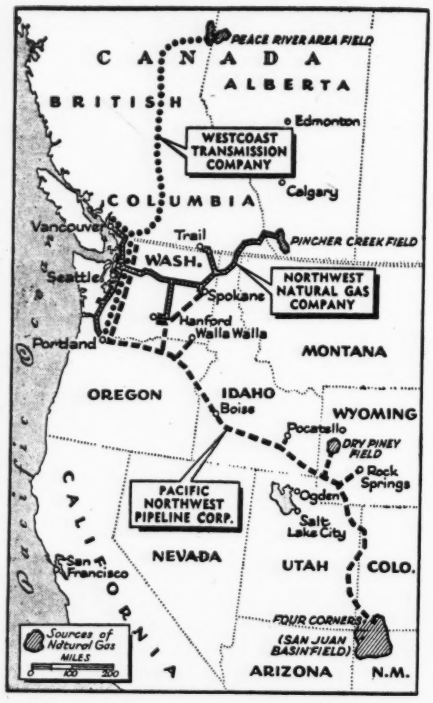

Northwest battle lines. As hearings were resumed before FPC Feb. 16 on the proposal to serve the coastal states with natural gas, here's the way the propositions of the three chief contenders lined up. Pacific Northwest's often-altered route now swings into Colorado and Wyoming in order to pick up reserves from Dry Piney and Rangely fields and make deliveries to Colorado Interstate at Rock Springs.

in new and existing compressor stations in Louisiana, Tennessee, Indiana, and Kentucky. Estimated to cost $33,752,705, it was designed to increase Texas Gas' daily delivery capacity by 295 MMcf.

While the 84 certificates issued in the six-month period ending Dec. 31, 1952, represent a decline from the peak during the 12 months of July 1, 1950 to June 30, 1951, when 173 certificates were issued, it is more than half the 136 certificates issued during the entire 12-month period immediately previous.

Since the Natural Gas Act became effective in February 1942, FPC has authorized construction of nearly 48,000 miles of pipeline, 3,400,000 hp in compressor units, at a cost of $3,337,000,000, to add more than 18 billion cu ft daily to delivery capacity in the nation.

TGT files to increase daily delivery 213 MMcf

As the hearings before FPC on the New England question continued last month, Tennessee Gas Transmission Co., parent company of Northeastern Gas Transmission Co., filed an application for authority to increase its daily deliveries to Northeastern from the present 220 MMcf per day to 433 MMcf, evidently on the assumption that Northeastern will win its fight and will be permitted to serve all New England.

Consolidated Edison got into the fight too—on Algonquin's side. In testimony before the FPC, the New York utility claimed that the Algonquin line was necessary to prevent the possibility of a hazardous situation developing in the New York area in case anything should happen to the Transcontinental Gas line, the only line now bringing gas to the area. If any mishap or minor curtailment should occur on the Transcontinental line, ConEd claimed it would suffer an interruption in the flow of natural gas and the company's 18,000 customers in northern Westchester would be in an especially hazardous situation. Consequently, ConEd has already signed an agreement with Algonquin to connect their lines for emergency use.

Ohio Fuel to convert 5 gas pools to storage

FPC has authorized the Ohio Fuel Gas Co., Columbus, to convert five natural gas pools in Ohio to storage service and to construct about 35 miles of 20-in. loop line. The latter will permit delivery of approximately 50 MMcf of gas per day into one of the new storage areas to be called the Holmes storage area.

The action authorizes Ohio Fuel to convert one pool in Ashland and Richland counties to storage as part of the company's Weaver storage area, and to convert four pools in Holmes, Wayne and Ashland counties to form the new Holmes area.

The company's proposal to convert one pool in Coshocton and Guernsey counties into a new area to be called the Guernsey storage was denied, however, on the ground that activation and operation of this storage area is dependent upon the receipt of natural gas from Tennessee Gas Transmission Co. and that a connection would be necessary in order for Ohio Fuel to receive gas from Tennessee. Tennessee has not made application for authorization to establish a connection.

In connection with the storage program Ohio Fuel is also authorized to build a 600-hp compressor station in the Holmes area and approximately 97 miles of pipeline to connect the storage areas with existing transmission facilities.

Kansas-Nebraska line extension approved

A decision has been filed by Presiding Examiner Francis L. Hall of FPC authorizing Kansas-Nebraska Natural Gas Co. Inc. Phillipsburg, Kan., to construct a new pipeline and related facilities on its transmission system in Kansas and Nebraska to increase the total daily capacity by nearly 10 MMcf from its presently authorized 182.6 MMcf.

The project, estimated to cost $2,576,6[illegible] includes about 196 miles of line, rearrangement of certain compressors, and town b[illegible]

there's an easier way to start a PIG

UNIBOLT scraper trap

makes line pressure do the hard work!

with oversize barrel

An oversize barrel on the sending and receiving ends of a line, slightly larger than the diameter of the pig, makes it easy to send or catch a scraper. Line pressure does the heavy work. But to make the job doubly simple and easy, you need UNIBOLT Hinged Scraper Traps. To open them, all you need do is release two bolts and the blanking plug swings open like a door. No heavy lifting. Nothing to fall on workmen. No time-consuming blind flanges to break out and make up. No danger of leaks. A self-sealing resilient ring assures a pressure-tight closure.

Wherever multi-bolt flanged couplings and closures are now being used . . . on strainers, scrubbers, mist removers, terminal manifolds, blowdowns or other pressure vessels . . . UNIBOLT Couplings will serve you better.

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der and metering stations to serve four small towns, Doniphan, Wisner, Pilger and Stanton, Neb., and 16 new industrial customers, including a sugar refinery in Ovid, Colo., and 15 alfalfa dehydration plants in Nebraska.

TGT and Rado plan joint gas processing program

Tennessee Gas Transmission Co. and Rado Refining Co. have joined in a program that will result in 15 to 20 MMcf of gas daily being added to the production of the McAllen (Texas) field. Rado is adding $500,000 worth of facilities to its refinery and Tennessee is building a 10-mile pipeline.

The new Rado unit is a low temperature glycol extraction plant which will clean the gas brought in by Tennessee through its pipeline. Residue gas will be returned to Tennessee. About 200 bbls of distillate per day will be produced.

AGA transmission meet to stress operations

Practical considerations of design, construction, and operation, as well as a smattering of such non-engineering problems as leasing and right-of-way, comprise the program for the first annual AGA transmission and storage conference, being held April 30-May 1 at Chicago's Edgewater Beach hotel.

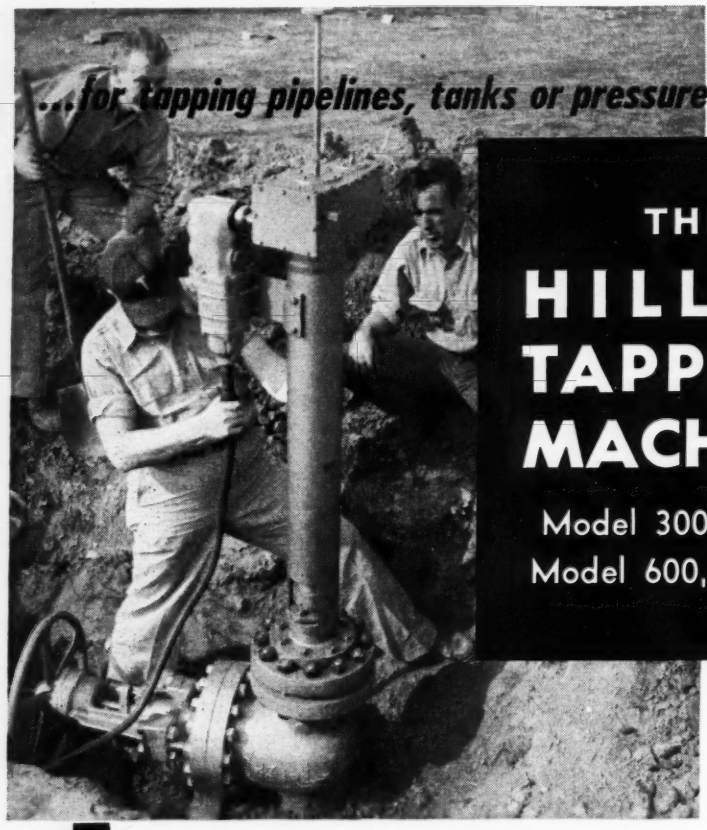
The engineers and operating men for whom the meeting was primarily pitched will exchange views and knowledge on such topics as compressor station operation, pipeline construction, maintenance, and pipeline cleaning. Morning general sessions will be followed by parallel luncheon meetings—extending into the afternoon—which will be of an informal nature.

This conference replaces the Natural Gas Department spring meeting, which was discontinued when the two AGA departments, natural and manufactured gas, were merged.

Lone Star begins gas storage project

Construction of facilities for underground storage of natural gas in the depleted oil and gas field near View in Taylor county, Texas, is under way by Lone Star Gas Co., Dallas. The company expects to start injecting gas into the reservoir through four wells by May 1. A 440-hp compressor unit is being installed about two miles west of Abilene which will inject approximately 5 MMcf of gas per day into the reservoir during low consumption periods.

The View field reservoir, which has a total storage capacity of more than 2 billion cu ft, is advantageously located near Lone Star's transmission facilities. Gas withdrawn to meet peak demands in cold weather will enter the company's system at the station near Abilene. Cost of the project will be more than $215,000.



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Notes

An FPC presiding examiner has filed decision authorizing Mississippi River Fu Corp., St. Louis, to construct about 1.6 mil of pipeline and metering and regulati facilities to supply natural gas on an int ruptible basis to Union Electric Co. of M souri. Deliveries of the gas, which will used as boiler fuel in Union's new generati plant, will be limited to 2600 MMcf the fi year and 4650 MMcf the second year.

The Mountain Fuel Supply Co., Salt La has been authorized by the Utah public se ice commission to supply an additional MMcf of gas daily to the Ogden-Salt L area. It has been delivering 193 MMcf. intensive exploration and production p gram begun a year and a half ago has sulted in 10 new producing gas wells extension of service is based on assura of a sufficient supply for at least 20 year

The Public Service Commission of U has set March 16 as hearing date for second amended application for Utah Nat Gas Co., Salt Lake City, to build, ope and maintain a pipeline with all neces appurtenant facilities and gathering line deliver gas to the Provo and Salt Lake

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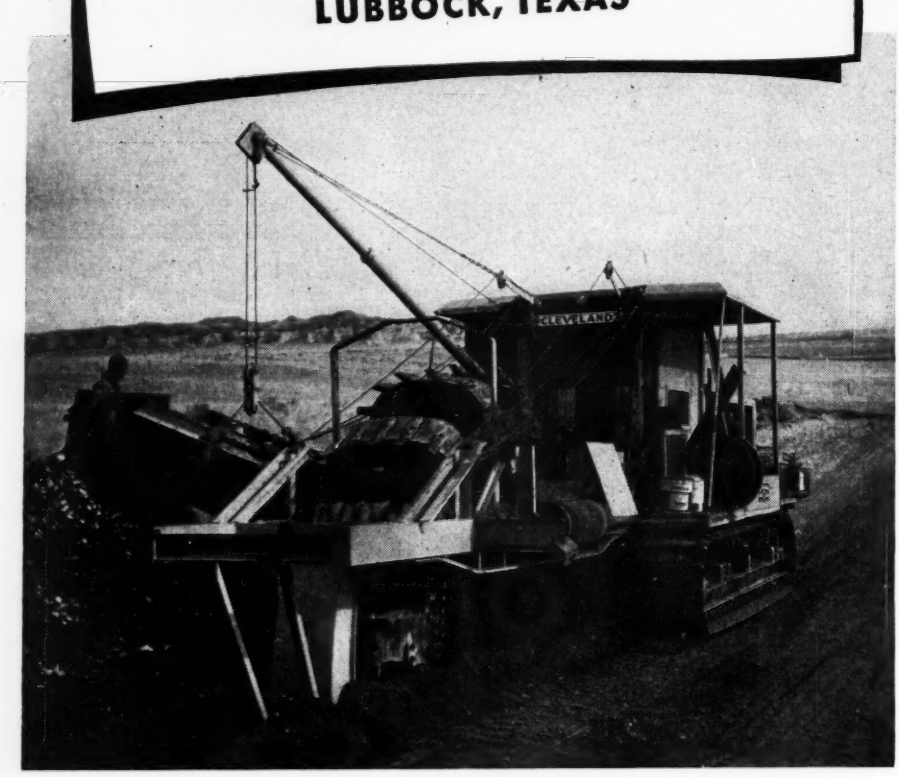

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The present plan calls for a 96-mile line beginning with 18-in. pipe from gas fields in Carbon, Emery, and Sanpete counties running northwest to a point near Provo and continuing with a 16-in. line extending to a point near Salt Lake City.

El Paso Natural Gas Co. announced recently it would start immediately on construction of a $2.5 million project to build a pipeline and cracking plant in northwestern New Mexico. Construction should be completed by Oct. 1. The plant, to be located near Gallup, will have a capacity of 80,000 gals. per day of propane, butane and other natural gas byproducts. The pipeline, which will extend to Blanco, will cost about $1 million.

Processing gas at the Three Bar gas injection and gasoline plant has begun. The plant, operated by Stanolind Oil & Gas Co.'s north Texas-New Mexico division, is part of a project designed to increase the ultimate recovery of oil from the Three Bar field. The four producing companies in the field—Stanolind, Champlin Refining Co., Superior Oil Co., and Humble Oil & Refining Co.—have joined in the cooperative gas injection program.

Contract to build Tennessee Production Co.'s 100-MMcf per day natural gas processing plant in the Agua Dulce, Texas, area has been awarded to the O. L. Olsen Co., Houston. The plant will recover approximately 70,000 gals. of liquid hydrocarbons daily. Construction is expected to be completed in the fall of 1953.

In a freak accident near Sterlington, La., last month, a laborer who had crawled into a pipeline to clean it was welded inside and died of asphyxiation when workers, who did not know he was inside, sealed the end.

Progress Reports

PLANNED

ATLANTIC SEABOARD CORP. and **VIRGINIA GAS TRANSMISSION CORP.**, Charleston, W. Va. Docket G-2062 for 5000-hp compressor station in Braxton county, W. Va.; 6600-hp station in Upshur county, W. Va.; and 5000-hp station in Shenandoah county, Va.; supercharging 3 units from 880 hp to 1100 hp and installation of one 1100-hp unit at existing station in Hardy county, W. Va.

CAROLINA NATURAL GAS CORP., Charlotte, N. C. Docket G-1956 for 40 miles of line to connect with Transco line near Kings Mountain, N. C., extending to Rock Hill, S. C., with laterals to four South Carolina points.

CENTRAL WEST UTILITY CO., Kansas City. Docket G-1682, four alternate plans to serve Clay county, Mo.

CHATTAHOOCHEE NATURAL GAS CO., Birmingham. Docket G-2066 for 70 miles of line in northwest Georgia, to connect with system of Southern Natural in Floyd county.

CHICAGO DISTRICT PIPELINE CO., Joliet. Docket G-2090 for 3.4 miles of 36-in.,

miles of 30-in. and a .3 mile river crossing of 24-in. pipe in the Chicago area.

CONNECTICUT GAS CO., Berlin. Docket G-1954 for 3 short pipelines, totaling about 2 miles, to extend from Connecticut Light & Power gas plants to Algonquin Gas Transmission Co. from plants at Waterbury, Willimantic and Putnam, Conn.

CUMBERLAND & ALLEGHENY GAS CO., Pittsburgh. Docket G-2059 for 17 miles of line in Garrett and Allegany counties, Md. and Mineral county, W. Va. and retirement of 75 hp in compressor units at station in Preston county, W. Va.

EAST OHIO GAS CO., Cleveland. A 125-mile, 26-in. pipeline to serve Cleveland area from point just south of Toledo.

EL PASO NATURAL GAS CO. Docket G-2106 for total of 1778 miles of line to include about 750 miles of 30-in. and 70 miles of 24-in. mainline with related gathering lines, purification facilities and compressor plants totaling 157,000 hp to carry gas from Permian and San Juan basins.

FREDERICKSBURG NATURAL GAS CO., Fredericksburg, Va. Docket G-2041 for 28½ miles of 4¼-in. line and .72 mile of 3½-in. line connecting with Transco line, extending to Fredericksburg and area.

GLACIER GAS CO., Butte, Mont. Dockets G-1816, G-1817, G-1818 for 285 miles of 20-in. from northeast of Kalispell, Mont. to Spokane, Wash.; 91 miles of 8⅝-in. from Spokane to Lewiston, Idaho; 120 miles of 16-in. from Spokane to Hanford, Wash.; 130 miles of 12¾-in. from Spokane to south of Trail, B. C.

GULF INTERSTATE GAS CO., Houston. Docket G-2058 to construct 860 miles of 30-in. line from Point Rayne, La. to Boyd county, Ky., 229 miles lateral lines and five 8000-hp compressor stations.

HOME GAS CO., Pittsburgh. Docket G-2059 for 46.7-mile pipeline in Tioga and Broome counties, N. Y. and retirement of 180 hp in compressor units at a station in Broome county.

LONE STAR GAS CO., Dallas. Docket G-2005 for a 2640-hp compressor station and 5 miles of 12-in. line to New York City field reservoir, Clay county, Texas.

MANUFACTURERS LIGHT & HEAT CO., Pittsburgh. Docket G-2059 for 194 miles of line and retirement of 171 miles of line at points in Pennsylvania, West Virginia and Ohio; retirement of 440 hp in compressor units at station in Fayette county, Pa.

MISSOURI CENTRAL NATURAL GAS CO., Macon, Mo. Docket G-1509 for 25 miles of 6-in. from Moberly to Macon, Mo.

MISSOURI PUBLIC SERVICE CO., Warrensburg. Docket G-2057 for 109.3 miles of 8- and 10-in. main line and 27.1 miles of lateral lines. System to connect with Panhandle Eastern Pipeline Co. line at Franklin, Mo. and extend northwest.

MORGANFIELD NATURAL GAS CO., Morganfield, Ky. Docket G-1935 for a 31-mile, 4- and 6-in. line lateral to proposed Texas Gas Transmission Corp. line, to serve 6 Kentucky communities.

NATURAL GAS CO. OF W. VA., Pittsburgh. Docket G-2059 for 7.46 miles of line and retirement of same amount in Columbiana county, Ohio.

NEW YORK STATE ELECTRIC & GAS CORP., Ithaca. Docket G-1999 for total of 49 miles of pipeline; 25 miles 10-in. from DeRuyther to Norwich, N. Y., 24 miles 8-in. from Norwich to Oneonta, N. Y.

NEW YORK STATE NATURAL GAS CORP., Pittsburgh. Docket G-1980 (in part) for a 75-mile, 20-in. line from southern end of Driftwood field line to main dual line in Armstrong county, Pa. To be constructed in 1953.

NORTHERN NATURAL GAS CO., Omaha. Docket

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The last obstacle in the path of Texas Gas Transmission Corp.'s 363 miles of 26-in. loop line was the Chicago-to-Florida highway, U. S. No. 41. H. C. Price Co. pipeliners here place casing for the line under the highway near Slaughters, Ky.

G-1918 for 400 miles of 24-in. pipe from the United States-Canadian border to a point near Minneapolis and two compressor stations with 5280 hp each.

NORTHERN NATURAL GAS CO., Omaha. Docket G-2009 for a 6.5 mile 30-in. loop line from Bushton, Kan. compressor station, northeasterly to a point in Ellsworth county; a 1.4 mile 8⅝-in. branch line from its Omaha branch line to a proposed regulating station near La Platte in Sarpy county, Nebr.; a 1320-hp addition to Hugoton, Kan. compressor station.

NORTHERN NATURAL GAS CO., Omaha. Docket G-2063 for 425 miles of mainline additions to connect with Permian Basin Pipe Line Co. system, and 62,400-hp in new and existing stations in Texas, Oklahoma, Kansas, Nebraska, Iowa, Minnesota and South Dakota. Also 475 miles of branch lines and additions to serve customers in Iowa, Minnesota, Nebraska and South Dakota.

NORTHWEST NATURAL GAS CO., New York. Docket G-996 for 1296 miles of 18-, 20-, 22-, and 24-in. line in Washington, Idaho, Oregon and British Columbia, together with laterals and four compressor stations aggregating 27,500 hp.

PACIFIC GAS & ELECTRIC CO., San Francisco. Docket G-2102 to build about 170 miles of 34-in. mainline loops and 15,000 hp in compressor capacity on line from Topock, Ariz. to a point near Milpitas, Calif.; and 8 miles of line between Milpitas and Irvington, Calif.

PACIFIC NORTHWEST PIPELINE CORP., Houston. Docket G-1429 for 1384 miles main line; 316 miles of spur and lateral lines; and 8 compressor stations totaling 61,000 hp, to extend from Ignacio, Colo., in the San Juan basin, to Bellingham, Wash. (Seattle area).

PERMIAN BASIN PIPELINE CO., Omaha. Docket G-1928 for 163 miles of line and 66,000 hp in compressor stations to carry gas from Upton county, Texas and Lea county, N. M. to connection with 24-in. El Paso Natural line to Dumas, Texas.

SHENANDOAH GAS CO., Lynchburg, Va. Docket G-1448 for 39 miles of line from a point near Middletown, Va. to points near Winchester, Va. and Martinsburg, W. Va.

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SOUTH CAROLINA NATURAL GAS CO., Columbia, S. C. Docket G-1961 for a 160-mile pipeline in Aiken, Lexington, Richland, Orangeburg, Dorchester, Charleston, and Berkeley counties, S. C.

SOUTH GEORGIA NATURAL GAS CO., Birmingham. Docket G-1915 for a 339-mile line to serve communities in southwest Georgia and northern Florida. Main trunk would connect with system of Southern Natural Gas Co. in Lee county, Ala., and extend to Albany, Ga., with a branch to Tallahassee, Fla.

SOUTHERN CALIFORNIA GAS CO. and **SOUTHERN COUNTIES GAS CO.,** Los Angeles. Docket G-2104 to build about 73 miles of 30-in. mainline loops and 5280 hp in additional compressor capacity on existing line extending from Blythe to Santa Fe Springs, Calif.

SOUTHERN NATURAL GAS CO., Birmingham. Docket G-1907 (partially approved). Application still open for 715 miles of various size pipelines and three compressor stations totaling 14,200 hp in Alabama, Georgia, Mississippi.

TENNESSEE GAS TRANSMISSION CO., Houston. Dockets G-1921 and G-1922 for a presidential permit to construct and operate facilities at the International Boundary north of Niagara Falls and for FPC certificate for 45 miles of 20-in. from Buffalo to Niagara; 107 miles of 26- and 30-in. loop on mainline; six new compressor stations with 80,500 hp; 51,500 hp in old stations; 50 miles of laterals; aerial suspension bridge over Niagara river.

TRANS-CANADA PIPE LINES LTD., for 2200-mile line from Alberta to major cities as far east as Montreal.

UNITED FUEL GAS CO., Charleston. Docket G-2061 for 50.5 miles of pipeline from new 2640-hp compressor station at existing storage pool in Wood county to Lanham station in Putnam county, W. Va. Also acquisition of leaseholds and authority to drill wells, install well and field lines for proposed new storage pool.

UTAH NATURAL GAS CO., Salt Lake City. To build a 96-mile line, beginning with 18-in. pipe from fields in Carbon, Emery and Sanpete counties running northwest to a point near Provo and continuing with 16-in. pipe to a point near Salt Lake City; laterals, field and gathering lines, dehydration plants and appurtent facilities.

WESTCOAST TRANSMISSION CO. INC., Wilmington, Del., 349 miles, including 277 miles from Sumas, Wash. to Portland, Ore. with short branches to a number of cities in the two states, and 72 miles of laterals and 13 measuring stations. To connect with 683 mile 24-in. line to be built by parent company, Westcoast Transmission Co. Ltd., from Peace river area of Alberta and B.C. Location survey under way.

UNDER WAY

ALGONQUIN GAS TRANSMISSION CO., Boston. Facilities including several laterals remain to be completed. Work held up pending further FPC hearings.

ARKANSAS-LOUISIANA GAS CO., Shreveport. Docket G-1979 for 6 miles of 12¾-in. line in Hot Spring county and a 7500-hp compressor station on the company's "Line S" between Waskom, Texas and Perla, Ark. Delta Engineering Corp. at work.

CITIES SERVICE GAS CO., Oklahoma City. Docket G-2038 for installation of 11,400 hp compressor capacity—three 1600 hp units to be added at its Greensburg station, Kiowa county; six 1600 hp units in a new station in Harvey county, Kan.

COLORADO-WYOMING GAS CO., Denver. Docket G-1821 for 1½-mile 8-in. loop near Cheyenne; 2-mile, 8-in. replacement on Golden, Colo. lateral. Completion scheduled for September 1953.

EL PASO NATURAL GAS CO. Dockets G-1630, G-1631 for about 170 miles of 30-in. mainline

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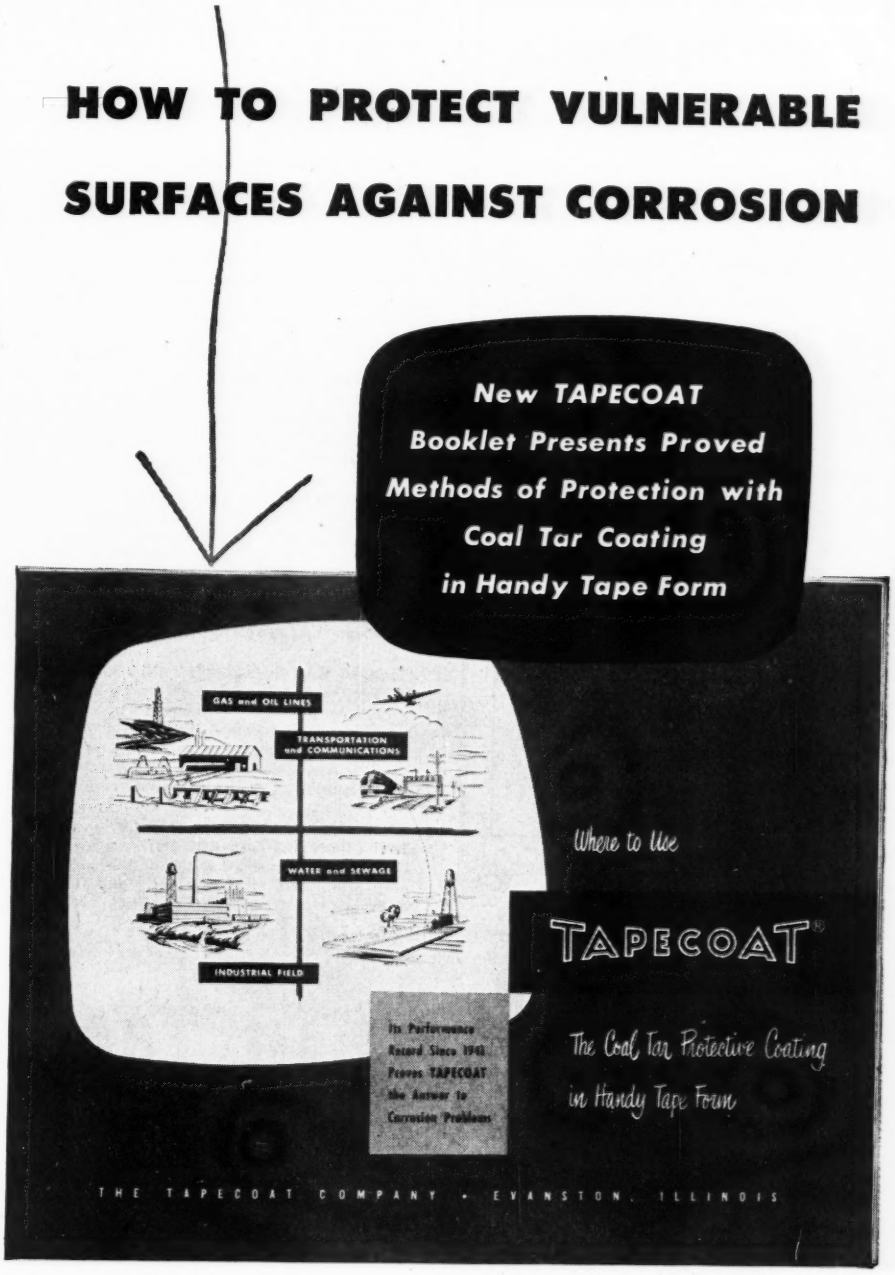

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loop on existing transmission system, and about 153,000 hp in mainline and booster compressor stations.

HOUSTON PIPE LINE CO. has Houston Contracting Co. at work on 40 miles of 16-in. line from Edna, Texas to the Tom O'Connor gas field.

MIDSOUTH GAS CO., Little Rock, Ark. Dockets G-1445 and G-1680 for 118 miles of line in **Greene, Crittenden, St. Francis, Lee, Phillips, Monroe, Woodruff, Poinsett, and Cross counties,** Ark.

MILWAUKEE GAS LIGHT CO., Milwaukee. Construction scheduled to be completed April 1 on a 20-in. line extending east 7 miles from Menomonee Falls.

NORTHERN NATURAL GAS CO., Omaha, has Reese Brothers Construction Co. at work on 140 miles of gathering lines in Kansas and Oklahoma. About three-fourths complete. Remainder to be completed by spring 1953.

NORTHERN NATURAL GAS CO., Omaha. Docket G-1618 for 213 miles of 26-in. loop lines in Texas, Oklahoma, Iowa, Kansas, Nebraska and Minnesota, and 100,160-hp additional compressor capacity. R. H. Fulton at work on 25 miles 26-in. loop south of Bushton, Kan. compressor station. C. S. Foreman at work on 2000-ft Arkansas river crossing in Kansas.

PACIFIC GAS & ELECTRIC CO., San Francisco. Docket G-1651 for 86.25 miles 34-in. loop and 19,540 hp addition on existing Topock-Milpitas line. Engineers Limited Pipeline Co. at work on loop construction. Bechtel Corp. at work at Hinkley and Kettelman compressor stations. Expect completion of project in summer 1953.

SOUTHERN CALIFORNIA GAS CO. and **SOUTHERN COUNTIES GAS CO.,** Los Angeles. Docket G-1718 for about 20 miles of 30-in. loop line east from Whitewater, Calif., and 13,520-hp additions to compressor facilities on existing line from California-Arizona boundary to Los Angeles. Construction on compressors under way.

SOUTHERN NATURAL GAS CO., Birmingham. Docket G-1907 (in part). Miscellaneous sized lines for gathering system, 384 miles to be laid south of Gwinville, Miss.; 5400-hp compressor at Gwinville; and 3300-hp compressor station at Estopinal, La. Brown & Root Inc. and Houston Contracting Co. at work with completion expected Oct. 1, 1953.

TEXAS GAS TRANSMISSION CORP., Owensboro. Docket G-1847 for 408 miles of 26-in. loop line in six sections. H. C. Price has 44 miles remaining to be completed next spring.

UNITED NATURAL GAS CO., Oil City, Pa. Docket G-1854 for 15.1 miles 12-in line and replacement of 6.5 miles 8-in. line in Venango county, Pa. delayed by pipe deliveries. Expected to be completed by June 1, 1953.

PENDING CONSTRUCTION

EAST TENNESSEE NATURAL GAS CO., Knoxville. Docket G-1336 for a 100-mile, 16-in. line from near Knoxville to Kingsport, Tenn. with about 58 miles of various sized lateral lines.

IOWA-ILLINOIS GAS & ELECTRIC CO., Davenport. Docket G-2012 for 22 miles of line to connect with Natural Gas Pipeline Co. of America's system in Mahaska county and extend to a point in Ottumwa county, Iowa.

NEVADA NATURAL GAS PIPE LINE CO., Las Vegas. Docket G-1888 for 120 miles of 12¾-in. line from Topock, Ariz. to Las Vegas and Henderson areas. Construction scheduled to start about July 1, 1953. H. G. Laub, pres., 7th & B St., Victorville, Calif.

OKLAHOMA NATURAL GAS CO., Tulsa. To build 50-mile 18-in. line from Sapulpa to Pryor, Okla. to serve chemical plant to be constructed by Deere & Co. and Grand River Dam Authority furnaces. Construction to begin in the spring to be completed by fall 1953.

PACIFIC GAS & ELECTRIC CO., San Francisco. Docket G-1892 for 20 miles of 16-in. line from Burrell to a point near Easton, contract let to Alex Robertson Co. with completion scheduled for mid-March; 15 miles of 20-in. pipe extending from Helm and joining the system's Topock-Milpitas line in Fresno county; and for 15.5 miles of 12¾-in. in Madera county parallel to the existing Madera-Livingston line, scheduled for construction in 1953-54.

TENNESSEE GAS TRANSMISSION CO., Houston. Dockets G-1573 and G-1614 for 591 miles of line parallel to existing system, a 304-mile line from near Mercer, Pa. to Utica, N. Y. with a total of 165,000 hp to be installed at new and existing compressor stations. Also 250 miles of miscellaneous lines.

TEXAS EASTERN TRANSMISSION CORP., Shreveport. Docket G-1947 for 315 miles of 2[illegible] in. line from a connection with Wilcox Trunkline at Provident City, Texas, to connect with existing system near Castor, La. Contract being executed.

WILCOX TREND GATHERING SYSTEM INC., Dallas. Docket G-1959 for one 2200-hp compressor station; 157 miles of line from McMullen county to connection with Texas Eastern at Provident City, Texas; and about 60 miles of laterals. H. B. Zachry Co. is trunkline contractor.

APPROVED

KANSAS NEBRASKA NATURAL GAS CO., Hastings. Docket G-1857. To build 196 miles of line in Kansas and Nebraska and rearrange certain compressors, stub lines and metering stations to serve four small towns and 16 new main industrial customers.

OHIO FUEL GAS CO., Columbus. Docket G-[illegible] and G-1985 for five gas pools to be converted to storage; one in Ashland and Richland co[illegible]

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